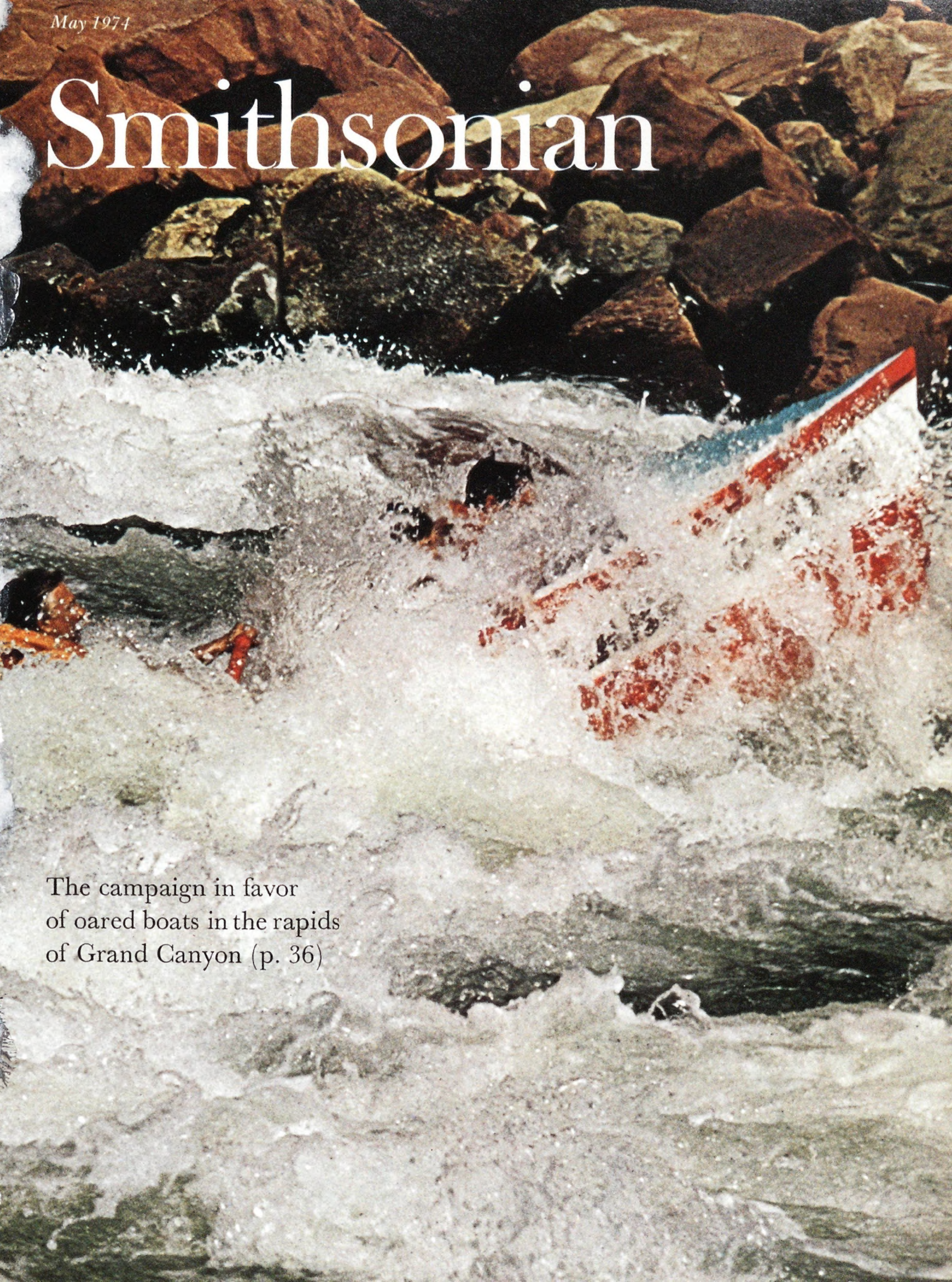
May 1974

Smithsonian



The campaign in favor
of oared boats in the rapids
of Grand Canyon (p. 36)

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Smithsonian

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How to get to Nova Scotia in spite of everything

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COULDN'T YOU USE A LITTLE NOW?

Secretary Ripley's comments

The view from the castle

The growing trend among zoos to become breeding farms for endangered species may save animals—as well as zoos themselves

Are zoos on the way out? The question comes at a time when humans are approaching their animal colleagues on this little planet with new respect and appreciation. With increasing awareness of the plight of vanishing species, a vague consensus has developed that we are all "in it together." And yet, at the moment, zoos stand in an uncertain, in-between position—perhaps on the threshold of gaining new status as educational institutions, perhaps on the threshold of becoming extinct.

The Smithsonian's own National Zoological Park started out, as did most of the 19th-century zoos, as an instructive tool for the people, combining recreation and pleasure with a sense of wonder and awe at the lavish diversity of animal life around the globe. During the early years of the century, as public visitation increased, such municipal zoos quickly became handicapped by problems of space, inadequate housing and eroded budgets. Zoo staffs, from keepers to directors, suffered from lack of funds, cynical city parks departments and the low status accorded the profession. But in spite of the social stigma attached to zoo employment, zoos continued to earn fierce loyalty from those who labored in sad and decaying surroundings.

Since World War II, zoo administration has received a lift. Enthusiastic public interest in animals, fostered by the new worldwide perspective, has produced a generation of active zoo professionals who are eager to experiment away from the constraints of prisonlike concrete and steel cages and are concerned with captive rearing programs. Species such as Père David's deer have long since become extinct in the wild, and now survive in zoos only because of such foresight. Similar programs may ultimately prove the salvation of many other species, such as the golden lion marmoset and the orangutan (see SMITHSONIAN, December 1972 and November 1973). This healthy new look has coincided with a tremendous surge of medical interest in animal pathology, animal behavior and, somewhat controversially, the physiology of the brain.

As the world shriveled under the impact of jet transport, vast quantities of wild animals were trapped and caught up in an expanded zoo and medical research trade. But now, with our sudden environmental awareness, a rash of national legislation is putting a rapid end to trade in animals. Restrictions will surely continue to tighten until zoo keepers find themselves almost entirely dependent on homegrown animals. It will then only be heads of state who will be able to give grand gifts of pandas and musk-oxen, tigers and buffaloes. And who knows? In the cultural revolution to come, even these rarefied exchanges may eventually be frowned on as barbaric or unwanted frills of rank.

In any event, after a ten-year search, our National Zoo has found a breeding farm area in nearby Front Royal, Virginia. Here, on some 4,000 acres (formerly a Department of Agriculture research station), more rare species can be bred in captivity and later exchanged with collaborating institutions. If these arrangements and others like them succeed, then zoological gardens will continue to delight and instruct the young and their parents with the fascination of a Noah's Ark. Otherwise, zoos are likely to become as extinct as many of the animals they once delighted in caring for.

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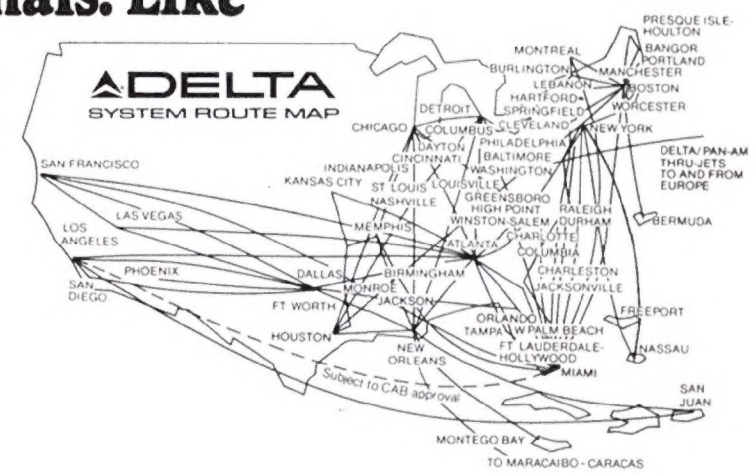

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Phenomena, comment and notes

Sunburn and SSTs, the landlubbers' prejudices, a job for Superpet and shaping up the metric system

For many of us, the idea of abandoning feet and inches and converting to the metric system is akin to one's thoughts before a trip to the dentist: It will be good for us but probably painful and it would be nice if it could be postponed. Nonetheless, it has begun. This year unsuspecting school children in Florida, for example, began to think metric. One sees occasional highway signs showing both miles and kilometers.

The question is not whether to go metric but how *far* we should go. A Boeing engineer and mathematician named E. Lewis Frasier wrote in *Science and Public Affairs* that the International Metric System leaves a lot to be desired in the way of consistency and, to those of us who are already having trouble remembering if a meter is longer or shorter than a yard, his perfectionist remedies are terrifying.

Take the circle. Says Mr. Frasier, the astrologers of ancient Babylon gave it 360 degrees, and that's how it remains today with each degree having 60 minutes and each minute having 60 seconds—an altogether unseemly situation in "this modern decimal era." (You will recall that the Dutch mathematician, Simon Stevin, ushered us all into the present era in 1585 when he invented the decimal point.)

The solution for the inappropriate sexagesimal circle? Reserve the term "degree" for thermometers, keep "minutes" and "seconds" for clocks, and divide each quadrant of a circle into 100 "radials." This would have a profound effect on such things as navigation and geometry (not the least of which might be that both students and sailors would spend a good deal of time being lost).

Speaking of time, it, too, is fouled up, according to Mr. Frasier. Perhaps as a sop to those lost sailors, he suggests that as a first step we drop A.M. and P.M. and adopt the 24-hour clock used by the Navy and various other organizations. The next step? Decimalize. How about a 25-hour day, with 2,500 minutes and 250,000 seconds (see illustration)? Then we can gradually learn to skip the hours altogether and just talk in minutes: Instead of high noon, Gary Cooper would have waited for a train that arrived at 1250 (spoken as twelve-fifty).

There are some nondecimalized units of measure that are sacred even to the most logical mind. Napoleon, says Mr. Frasier, failed to achieve the ten-month year and the ten-day week in France because of "strong religious adherence to

High noon is low noon on decimal clock.

the traditional seven-day week. . . . Any attempt to decimalize the week, month or year would end in frustration and calamity." Amen.

Rooting out bias

Practically every time you turn your back, new debate starts in Florida over one or another encroachment on that state's fragile ecosystems. In the newest ecofracas, the villain is not Man but an isopod, specifically *Sphaeroma terebrans,* a wood-boring crustacean that is busily destroying the roots of the red mangroves in the Ten Thousand Islands region. The

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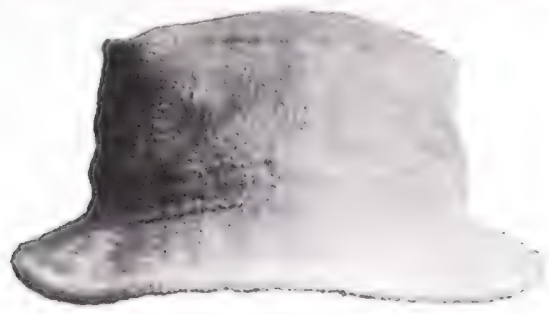

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mangroves host many birds and, it is believed, provide aid and comfort to the Everglades—in short, the isopod infestation is considered by many a potential ecocatastrophe.

But not by everyone.

One scholar of resource management at the University of Florida at Gainesville wrote *Science* to suggest a loftier view: "What may be quite devastating to a component of a system may in fact perpetuate the survival of the whole system over a longer time span." An oceanographer from Scripps Institution in California agrees. Advocating an overall policy of nonalignment, he confesses to being a crustacean-admirer and declares that *Sphaeroma* has been "hitherto rare and underprivileged," thus firing the first shot against what we can expect will become known as anti-isopodism.

A solar cure

Before long, droves of Americans will head for the beach and here, one learns from *Medical World News,* is what will happen when all those acres of midriffs are turned upward to the sun.

When the sun's rays hit all that white flesh the skin will release a substance called arachidonic acid and an enzyme system in the epidermis will convert it into prostaglandin, a fatty acid that is believed to mediate inflammation. And that, according to Dr. Diane Snyder of the University of Miami (where else?), is how you get a sunburn.

But Dr. Snyder has some good news. She may have come across a cure for those people not smart enough to take the sun a little at a time. Her experiments show that an anti-inflammatory compound called indomethacin (which is something like aspirin but hasn't yet been found to have aspirin's occasional side effects) provides blessed relief.

Using a weak indomethacin lotion, Dr. Snyder was able not only to reduce sunburn pain and impede blistering, but to convert the lobstery red into a tan. More testing will be done before the solution becomes available, however, so this summer's sun worshipers will simply have to employ caution.

Circumstantial evidence

Caution, however, may be in order even when and if Dr. Snyder's wonder salve

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comes on the market. It is thought (but not proved) that the same ultraviolet solar radiation that causes sunburn also causes skin cancer. This question will be studied by the National Oceanic and Atmospheric Administration in conjunction with the National Cancer Institute and Temple University, using funds supplied by (of all agencies) the Department of Transportation.

While there is some question of how all those sun worshippers will transport themselves to the beach this summer, DOT's interest in this question lies in the upper reaches of the atmosphere. There a layer of ozone exists that supposedly shields us from a good deal (but not all) of that kind of solar radiation that supposedly gives us skin cancer. And, it will be remembered, there was talk a few years ago that the nitric oxide expelled by a large fleet of SSTs would supposedly disrupt the ozone layer. So the NOAA-NCI-Temple-DOT research teams will attempt to dispose of all the "supposes" and provide us with some direct evidence one way or the other.

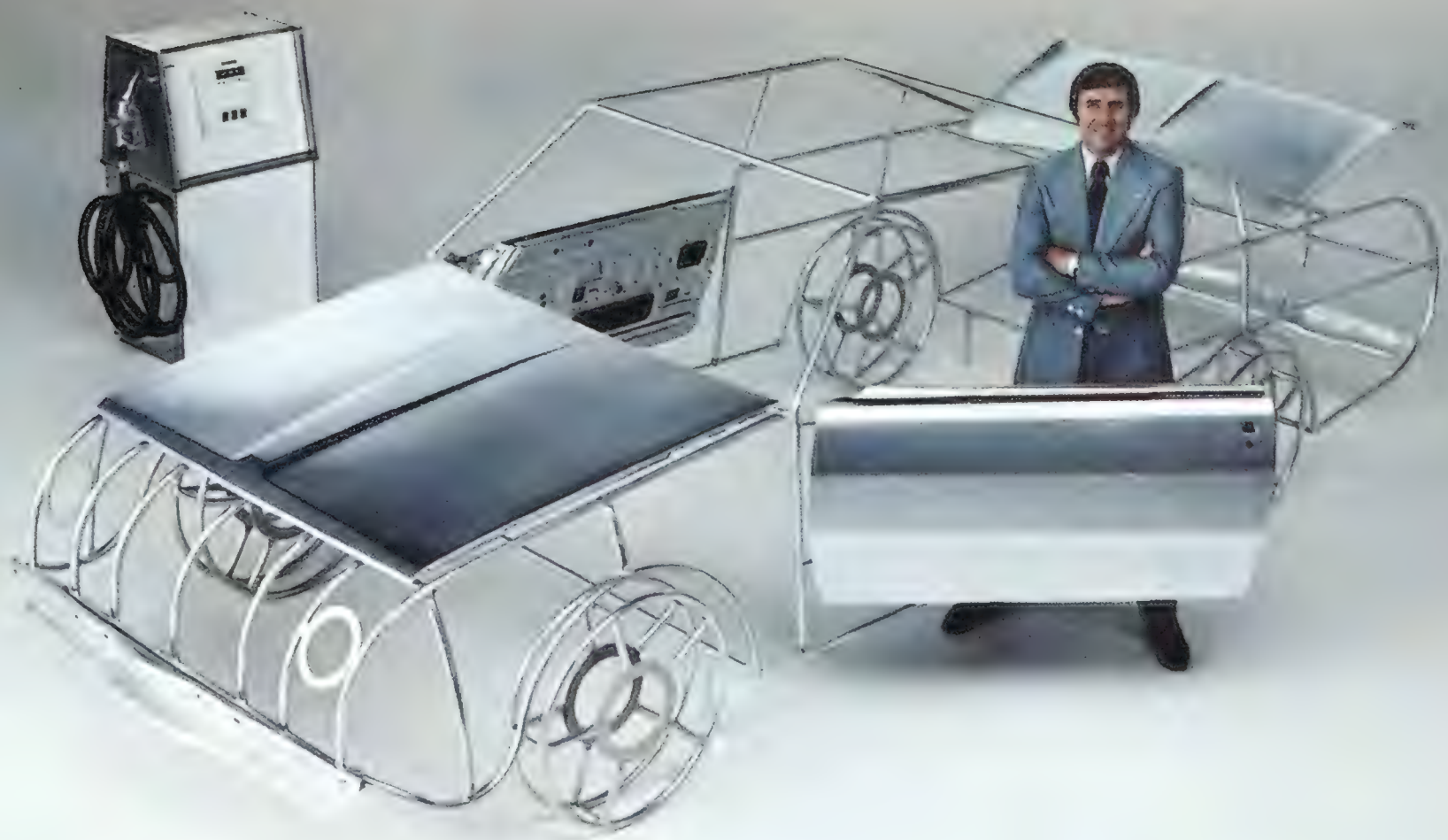
Meanwhile, NOAA has already found out one thing in this long chain of circumstantial reasoning: The naturally occurring nitric oxide level in the stratosphere (over New Mexico, at least) is less by a factor of three than what theory had predicted. There is about one part nitric oxide for every ten billion parts of air. What this means, NOAA can't say as yet.

Man's best shrink

There was a time, so the legends go, when society relied heavily upon its elders to keep people on an even keel. Nowadays, older doesn't necessarily mean wiser and industrial societies impatiently churn out wise men from professional schools.

One function of today's nearly instant sages is psychotherapy, an "industry" (as one of its spokesmen characterizes it) that will continue to boom as new ailments replace older ones. Anxiety, for example, may soon be less of a problem than the need for feelings of "self-fulfillment." New kinds of therapies will blossom and, judging from some recent developments, the therapy industry may well find itself in partnership with the pet food industry:

A notion, almost a canon, of animal psychology holds that there is a limited period when a young animal forms exclusive



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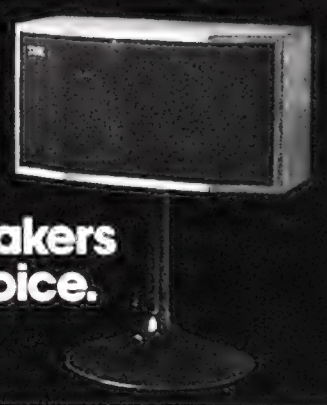

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and enduring emotional attachments—to a parent, a cloth dummy or even a psychologist. Sometimes called "imprinting," it has been widely studied, particularly among birds and some mammals. Now two psychologists at the University of California at Davis have cast a shadow on this dogma. They reported in *Science* that rhesus monkeys which were abruptly deprived of their love objects quickly and unanimously adopted as surrogates spayed female mongrel dogs.

A typically British study showed that a group of lonely pensioners who were given budgerigars as pets became quantitatively happier than a control group. (Each of the pensioners in the control group, it should be pointed out, had been given a begonia.)

In a more dramatic experiment at Ohio State University, Dr. Samuel A. Corson and his associates gave friendly dogs to 20 seriously ill mental patients who had not responded to conventional therapies, including drugs and electric shock. All but two of the patients soon accepted the dogs and began to improve, several (including one catatonic schizophrenic) improving enough to be discharged.

At a recent meeting on pets and society in London, Boris Levinson of Yeshiva University in New York foresaw a wholly pet-oriented society by the year 2000 in which household animals would serve and generally civilize humans. According to *New Scientist,* Mr. Levinson went so far as to propose a bit of genetic engineering in order to produce an ideal pet with the best attributes of the cat and the dog —a subject that in itself is conducive to nearly as much endless debate as religion and politics (not to mention the serious hazards of an accident in which the tinkerers produce a pet with the *worst* attributes of each animal). Without discounting for a moment the advantages of pet therapy, one also has to wonder how they will all be fed in a world of limited food supply and, even more alarming, where will all of the dog-and-kitty litter come from? And go to?

At any rate, you will know when the whole thing has begun in earnest when some enterprising university combines its school of psychiatry with its school of veterinary medicine.

JAMES K. PAGE JR.

Mariage du Prince Jérome Bonaparte. Detail from the painting by Jean-Baptiste Regnault (1754-1829). On August 22, 1807, the marriage contract between Napoleon's youngest brother and Catherine of Württemberg was signed in the presence of the Emperor and Empress and dignitaries from both courts. The religious ceremony took place the following day in the Palace of the Tuileries.

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Letters to the Editor

Energy

Dear Sir: In your article, "How to cut fat out of your home energy budget," in the March issue, you make the point that humidification reduces the discomfort that accompanies a lowered thermostat. While this is true, and while a lower temperature with higher humidity is also probably more healthful, as well as beneficial to furniture, the following counterargument is worth noting.

Turning down the thermostat and then running a humidifier does *not* provide an energy saving. It takes 5.4 times as much energy (latent heat of vaporization) simply to evaporate a gallon of water without raising its temperature as it does to heat it from just-melted at the freezing point to the boiling point. To raise the humidity of a reasonably tight, modest-sized house five-to-ten percent requires the daily evaporation of at least ten gallons of water. The heat energy to accomplish this evaporation amounts to more than 80,000 BTUs, whether this is done by boiling, a motor-driven humidifier (still more energy), or evaporation from pans of water. Either the furnace or auxiliary heating, such as a stove, must supply this energy, and this amounts to roughly ten percent of the average heating requirement for a house in the Midwest, according to a power company engineer here.

Philip S. Riggs
Drake University
Des Moines, Iowa

Evaporation of water does consume heat, even if only pans and plants are used. But our energy consultant maintains that you will still save on energy consumption if higher humidity makes a five-degree lower temperature tolerable. Ed.

Dear Sir: In your otherwise excellent article on energy conservation in the home, some advice calls for qualification if lives, as well as energy, are to be conserved.

Sealing up cracks and crevices in a house will indeed save fuel, but one should not be too zealous in the area of the heating plant. An insufficient supply of air can result in the production of deadly carbon monoxide, since gas- and oil-fired furnaces require oxygen to burn properly. A loose-fitting window in the furnace room is all it takes to correct an otherwise hazardous condition.

John M. Raymond jr.
Falls Church, Virginia

Dear Sir: I asked my 21-year-old son if he saw anything wrong with the drawing of the man and woman consuming energy while taking a shower. I regret to say that he said he did not.

I pointed out that I object to a naked woman and a semiclothed man, but I would not object if both were naked or both were clothed. I object to the *machismo* demonstrated by the male and the meekness shown in the female's posture.

Ms. Ria Billet
Camp Springs, Maryland

William Cullen Bryant

Dear Sir: In Russell Lynes' enjoyable article, "Countryman-poet let some fresh air into old New York," I would take exception to his judgment that Bryant, after practicing law near Cummington, Massachusetts, made an unfortunate choice in settling in Great Barrington.

It was there that he met Frances Fairchild and married her on January 11, 1821. It was also the birthplace of his first daughter, Fanny Bryant. It seems to me that with Bryant's ties to Great Barrington he surely must have found some happiness there.

W. F. Plume
Denver, Colorado

Dear Sir: Bryant had a deep attachment to Cummington and particularly to his former home there. When he had made his fortune in the big city, he repurchased the place and rebuilt what had been a rather humble cottage of the era into something much more pretentious. The

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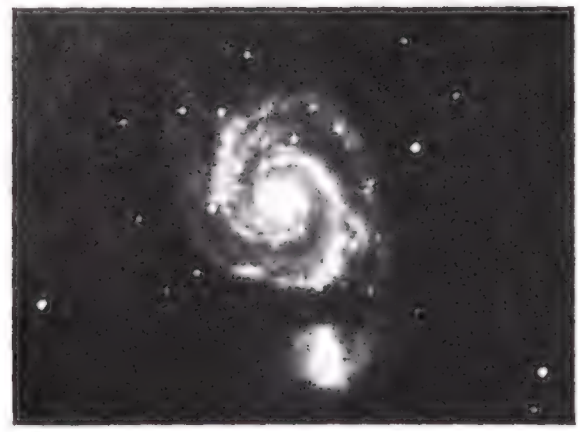

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old barn, a lovely one, still stands. And if one wants to test its temperature, the spring Bryant's pa dunked him in is still there. The house is now a National Landmark and is open to the public on summer weekends.
Laurence M. Channing
Boston, Massachusetts

Dear Sir: We in Roslyn, Long Island, are very proud, indeed, that Mr. Bryant made his home in our community, overlooking Hempstead Harbor on the north shore. He established our present library which bears his name and many of his memorabilia have been preserved there.
Mary Jane Wasch
Roslyn Heights, New York

Dear Sir: I've found an error in your caption in my article on William Cullen Bryant. In the painting, *Kindred Spirits,* Byrant is incorrectly placed on the right; Thomas Cole is actually on the right. Another point is that Colonel John Trumbull was not head of the National Academy of the Arts of Design but of its predecessor, the American Academy of Fine Arts, which was just as stuffy as Trumbull himself.
Russell Lynes
North Egremont, Massachusetts
Author Lynes is correct. Ed.

View from the castle

Dear Sir: Secretary Ripley says, "Americans, representing six percent of the world's population [gobble] up some 40 percent of the world's resources. . . ."

He should note that the USA also provides more than 31 percent of the world's wheat exports, 55 percent of the corn, 89 percent of the soybeans, 20 percent of the rice and 54 percent of the edible vegetable oil. Without these exports, substantial portions of the world's population would not exist. I think the world gets a damned good bargain from our six percent of the population.
O. H. Wright
Bartow, Florida

American medical dolce vita . . .

Dear Sir: Unfortunately, the general public is unlikely to find any humor in the article by Dr. Donald Gould, a British physician, and only take it as another blast against American medicine. Dr.

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Gould alludes to the fact that doctors have a lot of time for hedonistic activities and therefore that a magazine, *Rx Sports and Travel,* is published to serve this purpose. When he talks about tax deductions for trips, he never mentions the few deductions doctors are allowed to take compared to the average U.S. businessman. Nor does he mention what has happened to the quality of medical care in England since socialization.

Richard L. Glatzer, M.D.
Miami, Florida

Tax experts assure us that, as businessmen, doctors are not discriminated against. Ed.

Magellan

Dear Sir: Your article in the February issue, "Following Magellan's wake in his Strait," leads me to share a footnote on the trip of authors Samuel Eliot Morison and Mauricio Obregón. They passed through Cebu in late December 1971, and it was our honor and pleasure to be a part of the group showing them historic sites connected with Magellan.

Morison, Obregón and company came by plane, flying much of the way that morning at 50 feet above sea level, trying with the aid of Pigafetta's journal to trace Magellan's exact sailing route. After they landed on Mactán Island, where Magellan reputedly was killed, we took them to see three monuments—a demonstration of how time and viewer change historical perspective. The first, put up in 1866 by Isabella II of Spain, is dedicated to the Glory of God and Spain and, incidentally, to "Magallanes"; the second, placed in 1941 before the Philippines gained independence, simply notes the first circumnavigation of the globe and indicates Magellan's death on this spot; the third, erected in 1951 by the Philippine Historical Commission, is in honor of Lapulapu, the first Filipino to "resist Western aggression" by killing Ferdinand Magellan.

After we had seen the monuments, Admiral Morison asked me the direction of the beach where Magellan was killed. I pointed it out, but added, "It's covered with mangrove and very swampy." Mrs. Morison called to the retreating figure, "You might get your feet wet." Undeterred, Morison retorted: "You can't write history without getting your feet wet."

Margaret W. Sullivan
Cebu, Philippines

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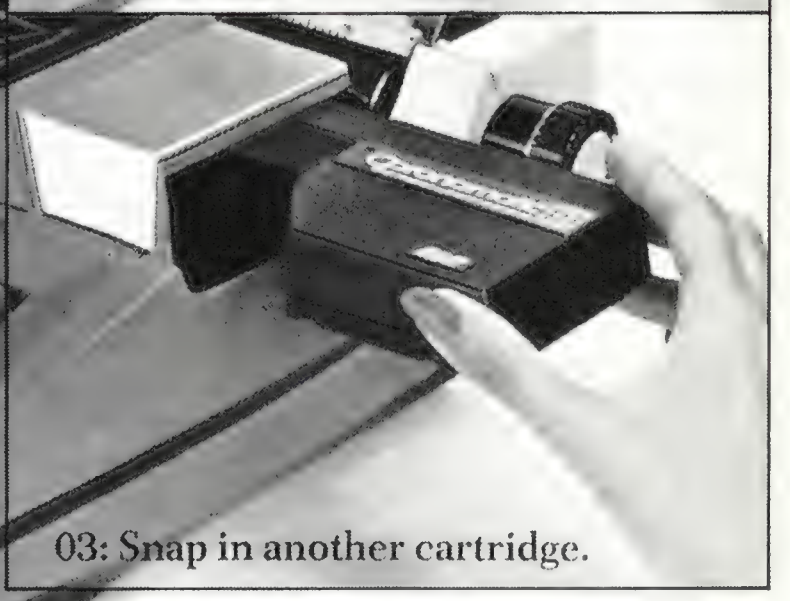
03: Snap in another cartridge.

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Parliament's punishment closes Boston Harbor

MAY 1774

American Colonials in their seaboard cities are accustomed to getting news from the Mother Country at irregular and sometimes long intervals, depending on the whims of the North Atlantic. It has been five months now since Boston held its tea party, and there has been no *official* reaction from London. The Whigs are considering the heady possibility that they may have got away with it; the Tories are bemused, but equally relieved.

There is a sense of optimism as spring comes. The Committees of Correspondence which were designed to keep the Colonial centers aware of mutual interests are in full operation; there is even an efficient postal service. And Whigs and Tories alike chuckle over the latest joke from London: "What are the Bostonians complaining about now?" "They say the fish in their harbor all taste of tea."

Yet Boston is a seafaring town, and in the back of everyone's mind is the nagging knowledge that winter in the North Atlantic is hardly the time for record voyages. No news does *not* mean good news.

When at last, on May 2, a vessel pokes into Boston Harbor after a tedious voyage of six weeks, the townsfolk experience a thumping drop back to reality. The news, six weeks old, is that Parliament is indeed acting on a suitable punishment for Boston. The details are still mostly guesswork, but the gist of it all—severity. The lawmakers are angry; even the Whigs

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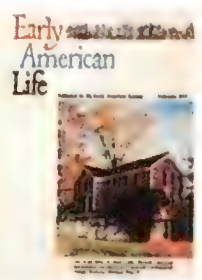

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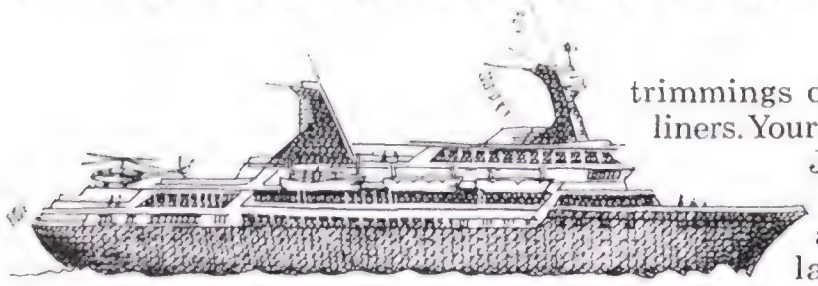

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in Parliament are finding it difficult to excuse the destruction of property.

Boston's heart sinks. And when, eight days later, HMS *The Lively* makes port after a fast voyage, she is met with foreboding. Here, at last, is the full announcement of the Boston Port Bill, a retribution so dire that the city is stunned.

The terms of the Act read like the tolling of a bell: Beginning June 1, no vessel may enter Boston Harbor. That includes the ferries that link the town proper with its neighbors around the peninsula. Vessels already in port must leave no later than June 14. From the 15th on, the city will cease to exist as a seaport. Its customhouse will move to Plymouth; Salem will become the capital.

After the first sickening shock, Boston reacts more typically—mass meetings. Paul Revere is back in the saddle again to carry the news south, before returning to his print shop to engrave his version of an English cartoon showing Boston, a helpless female, being given the tea treatment by authoritative males, one of whom is seizing the opportunity to peek beneath her flimsy gown (p. 22).

Riding hard and changing horses often, Revere makes fast time to New York and Philadelphia. By the time he's home again, his new royal governor, General Thomas Gage, has entered town, and spirits have risen a little for Gage is a likeable and familiar figure, known to all who have fought the French. He takes over with tact and caution—but he wears the King's uniform.

Samuel Adams and the militants run through the actions that could be taken to force Parliament to repeal the Boston Port Bill. Most effective might be an embargo, an end to all trade with Great Britain from every port in America. How would the British like to get along without tobacco, for example?

In the southern centers there is a mixture of anger at the implications of Boston's punishment—*any* port could be closed if one can be—and annoyance at the troublemaking Yankees who brought all this upon themselves by destroying property and now want everyone else to share the consequences. New Yorkers meet and argue about cutting off trade to Britain. Finally they decide to hold off until all the Colonies can be brought together in a sort of meeting—a congress, you might call it—to decide what to do.

The Philadelphians also meet and are

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even more wishy-washy. They call for a petition to the King on the part of all the Colonies, and they set aside June 1 as a day of mourning.

The news moves south. At the next center, Annapolis, the reaction to the port bill is brisk and bitter. The Marylanders, ever quick to argue about horse races and the muddied rights of their watermen on Chesapeake Bay, agree instantly to stop all trade with England—as soon as the other Colonies do—and also propose that no more debts be paid to Englishmen.

Down in Williamsburg, the Virginia House of Burgesses is in session. Late to arrive is George Washington, fuming over a murderous spring frost on May 4 which wiped out about half his wheat crop.

On May 19 word reaches the Burgesses of Boston's plight—now very near at hand. They react by proclaiming June 1 a fasting day. Immediately, things start to happen. Dunmore is furious that Boston's rebellious act be so memorialized and dissolves the Burgesses. Some go home, but many meet in the Apollo Room at Raleigh's Tavern and listen to some harangues on what to do now. Don't use East India Company tea, says Richard Henry Lee; also, denounce the port bill. News comes from Annapolis of its resolution regarding English debts. The planters, who live on a debt basis, cringe at the Annapolis idea, but agree to meet again and talk more. Patrick Henry, still honored for that blistering talk he gave back in '65, celebrates his 38th birthday.

In the midst of the excitement, the newly dissolved Burgesses go ahead with the ball they planned in honor of Lady Dunmore. It seems life must go on.

It goes on for others and ends for some. Philadelphia's John Bartram, naturalist and explorer, friend to Franklin and the great Linnaeus, botanist to King George and designer of an admired botanical garden along the banks of the Schuylkill, turns 75. In Versailles, the old king, Louis XV, finally dies, partially worried to his grave by thoughts of leaving France in the ineffectual hands of his gawky grandson. Now Marie Antoinette can send the royal mistress, Madame Du Barry, packing.

In London, meanwhile, Parliament is still at work on a number of other "Coercive Acts" designed to put Boston in its place. The Americans haven't learned the half of it, yet.

EDWARDS PARK

Next month: The other half.

L'Heure Bleue - 1913

Mitsouko - 1921

Shalimar - 1925

Vol de Nuit - 1933

Chamade - 1970

Guerlain has been doing beautiful things
to men and women for a long time

J. Paul Getty's dream museum: critics pan it, public loves it

The oil billionaire's vast art collection has a luxurious new home in Malibu, copied from an ancient villa in Herculaneum

By David Shaw

Color photographs by Lee Boltin

An enormous pool, not yet filled with water, ornaments the entranceway to the Getty museum.

It sits atop a wooded hillside, at the end of a winding, rough-hewn driveway, overlooking the blue Pacific. Critics have contemptuously compared it to Disneyland, Forest Lawn and William Randolph Hearst's San Simeon. "A plastic paradise in kitsch city," grumped one; "outstrips any existing monument to expensive, aggressive bad taste, cultural pretension and self-aggrandizement."

The controversial new J. Paul Getty Museum, unlike the above-named California curiosities, has suddenly emerged as a compelling cultural attraction. The building, now open to the public, is about eight times larger than the original museum that Getty had built on an adjacent site in 1954. Like the old museum, the new one is part of the oil billionaire's 65-acre estate in Malibu, California.

The museum is a re-creation of the Villa dei Papyri in Herculaneum, near Pompeii, destroyed by the eruption of Vesuvius in A.D. 79. The villa, believed to have been owned by Lucius Calpurnius Piso, the father-in-law of Julius Caesar, has interested Getty ever since he first visited Pompeii and Herculaneum in 1912. Since Getty himself has described classical sculpture as his "personal preference" in art, it is not so surprising that he should decide to build his own monumental legacy in the style of an ancient Roman villa.

The approach to the Getty Museum is through a 340-foot-long colonnaded garden (above), landscaped with trees, shrubs and flowers of species known to have been cultivated in Roman times. The walls that ring the garden are decorated with illusionistic paintings of architecture in the manner of the latter half of the first century B.C. Within, there is another garden with a smaller pool, flanked by bronze statues. These figures of young women, dressed in long, simple garments (p. 33), are replicas of bronze statues found at the Villa dei Papyri. The original bronzes from Herculan-

Mr. Shaw, a feature writer for the Los Angeles Times, *also free-lances for a number of national magazines.*

In the second-floor galleries, a Renaissance copy of a Leonardo (above, extreme left) highlights a room full of Italian works. Rubens' *Diana and her Nymphs on the Hunt* (center, extreme left)

eum are now kept in the National Museum in Naples.

Visitors who come to gawk at the building usually wind up being favorably impressed by the Getty collection, which specializes in three areas: classical antiquities, 18th-century French decorative arts and European painting.

The chief emphasis—as well as the raison d'être for the design of the building—is Getty's collection of antiquities. "There is not even a handful of museums in this country that can equal or compete with the best of his gallery's antiquities," wrote Henry J. Seldis of the *Los Angeles Times*. "Nowhere in America is there a finer collection of Roman sculptural portraits." The ground-floor galleries, which house the antiquities, are modeled after typical rooms of the period. Their ceilings and floors combine the design and materials of that time—everything from wood to plaster and from mosaic to marble to relief stucco. In one gallery, known as the Room of Colored Marbles (opposite), there are 14 different kinds of marble. Some of it was originally quarried about 1,700 years ago.

Critics have been equally generous in their evaluation of the museum's collection of decorative arts—tapestries, carpets and furnishings made for the French monarchy (Louis XIV to XVI) and aristocracy. This part of the collection is said to be one of the finest in the country, on a par with New York's Frick Collection.

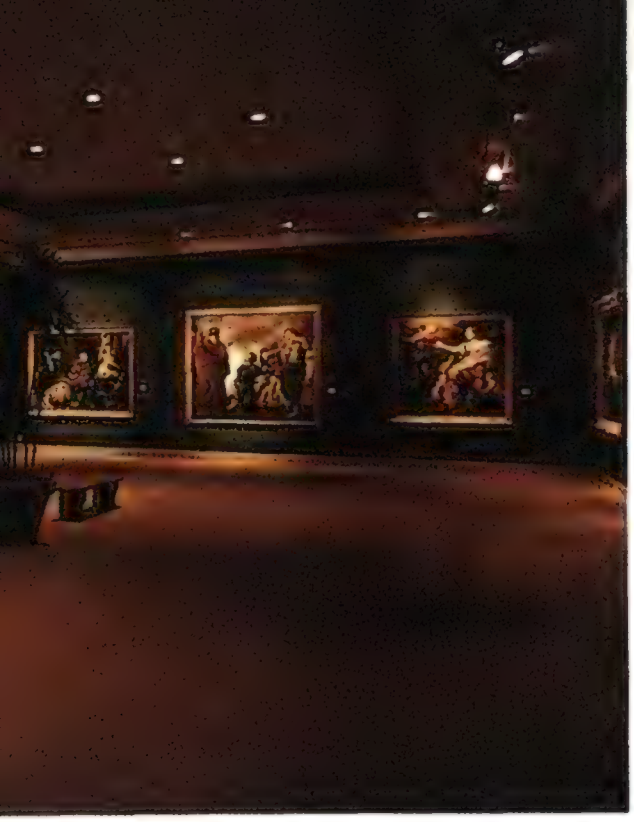
Even the museum's holdings in Renaissance and Baroque paintings have been widely praised, although this is, relatively, the weakest element of the three-part collection. The second-floor painting galleries (above), lavishly covered in silk damask, contain works attributed to such major names as Raphael, Titian, Rembrandt, La Tour and Gainsborough. *Four Studies of a Negro Head,* for many years thought to be by Van Dyck and now considered to be a Rubens (p. 34), is one of the jewels of the collection; the vibrant, 10-by-25-inch canvas cost Getty $1 million at auction in 1971.

Despite all the critical acclaim lavished on the collection, it is the design of the building that has drawn the most comment since it opened. And it is precisely the nature and quality of the art collection, vis-à-vis the re-created Roman villa in which it is now displayed, that has ignited the most heated art controversy of the 1970s on the West Coast.

Criticism of the museum design would appear to be essentially twofold. One school of thought holds that the museum building itself is not sufficiently neutral, that a museum ought not to be, of itself, a work of art, competing with the collections displayed therein. The other school of thought holds that it is permissible—at times, even praiseworthy—for a museum to be a work of art, but that the Getty building fails miserably as art because it is neither tastefully conceived nor accurately reproduced.

"It is a faithful replica of nothing that ever existed," wrote Los Angeles architecture critic John Pastier, "re-created by inappropriate technologies and frequently lacking in basic architectural design judgment. The details are all based on known Roman examples from various places, but they have been combined and executed in a manner that often negates their nature and purpose or creates an incongruous appearance. In short, the Getty Museum is a multimillion-dollar piece of unintended folk art. . . ."

Among the specific criticisms offered by Pastier and others dissatisfied with the museum-as-replica have been: Many interior walls and whole parts of the floor plan of the original villa have been shifted, and an entire wing of the original villa has been omitted.



is one of the key works in gallery devoted to baroque painting.

In one of the ground-floor galleries, the Room of Colored Marbles, several classical busts are mounted on the richly decorated walls.

Perhaps the most devastating single criticism of the authenticity of the museum design has been that excavation of the original villa site has been so incomplete that there is insufficient knowledge available to even attempt a legitimate re-creation. "No one knows about its precise style and details, how many floors it had or exactly how tall it was," wrote Pastier. The Getty Museum, he seemed to imply, was merely an exercise in guesswork.

J. Paul Getty himself has not yet seen his new museum, but he has responded with characteristic, if well-measured, disdain for those who have criticized it. The frail, 81-year-old tycoon has not visited his Malibu estate since 1951. He has been living in Surrey, in a 16th-century mansion (p. 32) on a well-guarded estate, Sutton Place, from which he has continued to direct his international financial empire—including the design, construction and acquisitions of his new museum. The museum is clearly Getty's, down to the last piece of mosaic tile. "No one did anything around here without consulting him first," says one of the curators.

To the complaints that a museum ought not to compete with its collection, Getty answers, "I'm opposed to that. Great works of art in the past were not produced to be exhibited in museums. They were created as ornaments of palaces, churches, public buildings."

To critics of the architectural and archaeological accuracy of his re-creation, Getty snorts, "If you don't happen to like Roman villas, you won't like the museum, but it's impossible to criticize it as not being an authentic Roman villa. We know it's authentic. We had experts with all the proper technical knowledge, and they went to great pains to make it authentic. It's not a 100 percent facsimile because no ancient building is 100 percent intact, but it's as authentic as possible, and for someone to say it isn't authentic because it has electric lights is ridiculous."

If Getty may be properly described as appalled by complaints that his museum is not an authentic reproduction of the Villa dei Papyri, then one would have to say Norman Neuerburg is positively apoplectic. Since 1949, Dr. Neuerburg has specialized in the field of ancient Roman architecture. A graduate of UCLA, he holds a Ph.D. from the Institute of Fine Arts at New York University, and he studied two years at the American Academy in Rome. He was Getty's consultant on the authenticity of the re-created villa, and he tends to take every attempt to denigrate that authenticity as a personal affront to his professional integrity.

Dr. Neuerburg's voice trembles and his hands shake when he responds to his critics, but he is not altogether singleminded in his own defense. "As for those self-styled experts who say the museum is not an accurate reproduction," he says, "I've been studying Roman architecture and planning for 25 years. If I don't know what the spirit of Roman architecture is after being so totally immersed in it for so long. . . ." He throws up his hands in disgust. "I spent three-and-a-half years full-time on the project.

"Sure, we took some liberties and we made some changes. We moved a few walls because the rooms would have been too small to be practical as galleries. Sure, we left off a wing of the original villa. But it was at the rear of the villa. It in no way changes the basic form and design and shape of the villa. You know why we left it off? We wanted to destroy as few trees as possible. We saw no reason to chop down all the trees just to be able to say we were 100 percent accurate."

As for the museum's bright colors, he claims they are the same basic hues the Romans used. "If anything,

J. Paul Getty and his dogs frolic outside his Tudor mansion in Surrey, about 25 miles south of London.

they're more subdued here. People have a preconceived idea that ancient architecture was all shiny white, when, in fact, everything was brilliantly colored, not pure white as you see them now."

Dr. Neuerburg denies that the museum is a pastiche of guesswork and fantasy. "I had an extensive library on Papyri and Pompeii long before I took this job," he says. "I had studied at the site and written on it for years. After I was hired, I made five trips to the site. I had access to all available primary source material, including Italian government archives and the fruits of the 18th-century excavation of the villa. We know more than enough about the original Villa dei Papyri to re-create it in Malibu."

To the layman, Dr. Neuerburg's protestations seem to ring true. Although some elements in the museum design—especially the walls of the peristyle garden—do smack more of a *Ben-Hur* film set than an ancient Roman villa, most of the museum appears to have been tastefully reconstructed. There were, of course, some necessary compromises. As Dr. Neuerburg rightly points out, the museum is just that—a museum, not a villa—and to sacrifice comfort, lighting, vantage points and proper gallery installation solely in the interest of architectural authenticity would have been fool-

Amid Gobelins tapestries, deputy director Stephen Garrett looks over a gallery. Getty is director.

hardy and self-defeating. Similarly, such everyday realities as 1970s building, fire and safety codes required the architects and contractors to deviate from the original plan of the Roman villa at times—sinking columns in concrete, for example, or installing a sprinkler system in the ceiling.

Amid all the controversy, the museum's three curators seem to be tolerating good-naturedly what could be a distracting and disconcerting preoccupation with everything but the collection. Jiri Frel, the Czech-born curator of antiquities, seems especially delighted with the surprising public interest in the museum. Dr. Frel spent three years as associate curator of Greek and Roman antiquities at the Metropolitan Museum in New York before coming to Malibu, and he has taken to the new setting with well-mannered glee, giving visiting college students and women's clubs a rambling, animated, high-spirited lecture as he guides them on tours of his galleries.

Burton Fredericksen, the curator of paintings, is a former Fulbright scholar, and although he willingly admits he would prefer museum visitors who "know enough about art to appreciate those pieces I personally think are best," he welcomes the curiosity-seekers who are ordinarily strangers to museums. "If we have done a good job," he says, "we may awaken in those people an interest in art for the first time. They may come back again and go to other museums, too. That would be a good thing."

The third curator—and unquestionably the most effervescent person associated with the museum—is Gillian Wilson, the British-born curator of decorative arts. Trained at the Victoria and Albert Museum in London, she subsequently won a fellowship at the Metropolitan Museum in New York, and is regarded as a top-ranking scholar in the decorative arts.

When her galleries were designed, Miss Wilson says, she insisted that visitors be provided maximum access to the individual works. "In most museums, the furniture is arranged so that people have to stand behind ropes and look at it. I was tired of seeing people bending over ropes. I wanted them to be able to get right next to everything."

"The critical scorn has by no means been a wholly negative factor," says Stephen Garrett (opposite page), a British architect hired as the deputy director of the museum (Getty himself is the director). "It has generated a surprising flow of public goodwill. People who you would not expect to write to a museum have been writing to say how fascinated and spellbound they

The inner garden, based on Herculaneum atrium, bears some resemblance to a California patio.

Black models were exotic subjects in 17th-century Flanders, which might explain why Peter Paul Rubens painted four views of this man's head. Some art historians think the work is by Anthony Van Dyck.

were by what they saw here—and to tell us how much they disagree with the critics."

Garrett actually seems much more disgruntled by speculation over the cost of the museum. Press estimates on construction costs have ranged from $12 million to $28 million, and Garrett refuses to dignify any guess with either confirmation or denial, preferring to intone that he is "utterly unsympathetic to the American obsession with judging everything by what it cost." Ironically, Getty himself is not the least bit reluctant to discuss the cost. "We budgeted $10 million," he says. "It cost $17 million."

Reliable estimates place the value of the collection inside the museum at almost twice that figure, with the single most valuable piece in the collection probably being Raphael's *Madonna of Loreto.* Getty bought the painting for less than $200 at an auction in 1938, when it was thought to be a copy after Raphael. It is now valued at more than $2 million. Getty's "personal favorite," according to the museum guides, is the Lansdowne Hercules (opposite), a Roman statue uncovered in 1790 at Hadrian's Villa at Tivoli. Getty is pleased that the Hercules, "which once delighted the Emperor Hadrian and for a century and a half was a pride of Britain, is now completely 'Americanized'—on view for all to see at the Getty Museum."

Curiosity-seekers so overwhelmed the museum in its first two weeks that it has since been forced to close on weekends. Parking facilities were planned for 200 cars, but on the second Sunday after the museum opened, there were 3,800 visitors in five hours. Traffic was backed up five miles along Pacific Coast Highway, and streets in neighboring residential areas were jammed with cars searching for parking places. Leaders of local homeowners associations demanded a meeting with museum officials. They didn't want their streets turned into parking lots, they said. Nor did they like the danger of traffic to their children.

As a temporary compromise, the museum—originally scheduled to be open Wednesday through Sunday—agreed to shift to a Monday-through-Friday schedule, closing on Saturdays and Sundays, the two days when traffic would be the heaviest. Museum officials still have not decided what to do next.

"We figure about 1,200 people is the optimum number we should have in the museum at any one time," Garrett says. If interest doesn't level off there, the museum may have to charge admission or remain closed weekends or even go to a reservations-only system.

"We would rather not do any of those," Garrett says. "We are open to the public. That is one of Mr. Getty's desires for this museum. The best way to permit the public to come is to make admission free, with no reservations, and to stay open on weekends, the only time some people can come. But we don't want to have hordes of people here, none of them able to enjoy themselves and appreciate the art because of the congestion. Mr. Getty will have to decide what to do."

The Lansdowne Hercules, a second-century Roman statue, has a marble-paved "temple" all to itself.

Tackling one of the canyon's savage rapids, boatman rows against current, guiding his dory into a maelstrom stern first so he can pick a course. Passenger, the author, hangs on.

Photographs by John Blaustein

By Robert Wallace

Wooden boats plus Colorado rapids equals adventure

If Major John Wesley Powell could make it down Grand Canyon without a baloney boat, so can others—and share his discoveries

One of the unlikeliest localities in this nation to suffer from overcrowding, it might seem, is the bottom of the Grand Canyon. Historian Hendrik Willem van Loon once calculated that the entire human population of the Earth could be compressed into a cube, one mile on each side, which could be dropped inconspicuously into the canyon. The last lonely tourist, hallooing on the rim, might not have even a dim notion where everybody had gone. Yet there *are* too many people in the narrow gorges where the Colorado River pursues its ferocious way.

It is not hikers or muleback riders whose numbers have increased in recent years. It is river-runners, sitting in ranks on big rubber barges, who have become much more numerous—and it is they and their outboard motors that have got the National Park Service into a bind. The Service has the responsibility of preserving the parks not only for but *from* the people. As recently as 1966, only about 1,000 voyagers a year went through the canyon, but with the advent of barges and motors the number had risen to nearly 17,000 by 1972. Accordingly, in December 1972 the Park Service, which licenses the operators, ordered them to cut their use of motors by 25 percent at the beginning of the 1974 river-running season. Next year and in 1976 there were to be further mandatory reductions, so that by the end of 1977 there would be no motors left in the Grand Canyon.

But the tour operators applied political pressure at the highest levels, and the Park Service was forced to

John Wesley Powell, one-armed explorer of the river, talks to an Indian guide near the Grand Canyon.

Baloney boat, named for its inflated pontons, rears up in a rapid as it speeds tourists downriver.

rescind its original order. The reduction in the use of motors will not now be mandatory—merely voluntary.

This raises a few questions in the minds of a good many people who are considering making a canyon voyage. Will the tour operators, at some financial loss, indeed volunteer to switch from motors to oars? In those horrendous rapids is a pair of oars truly as safe as a 20-horsepower motor? In fact, what is it like to go through the canyon in a rowboat?

I have made a couple of voyages through the canyon in small wooden boats, which scarcely qualifies me as an ancient mariner. But I do have something to say about canyon boating, and would like at the outset to make a couple of personal observations.

First, I am not a fanatic about the wilderness. I agree that a traveler in the wilderness should leave nothing behind but footprints, but it strikes me that extremism in this viewpoint really is a vice. Second, on one occasion in the canyon I was scared. I am a minor connoisseur of fright in small boats, having served in assault landings in the Navy, and it is my notion that the quality of fright available in the Grand Canyon is much superior. However, it is not *necessary* to get into frightening situations in the canyon, and most people never do.

Most white-water boatmen regard the Colorado as the roughest navigable river in the world. In the 285-mile-long Grand Canyon, it drops 2,200 feet and contains more than 150 rapids. At least one of them, Lava Falls, drops 37 feet. The current in a few of the rapids is so strong that it can peel a man like a banana, tearing off pants and belt, shirt and shoes in a few moments. And the rapids are not merely powerful: Their thunder is one of the most intimidating natural sounds on the planet.

I went down the river the first time not as an oarsman but as a passenger, and I chose a rowboat instead of a motorized raft because I was writing a book about the Grand Canyon and had read everything I could find about Major John Wesley Powell. Under direction of the Smithsonian Institution, Powell was the first explorer to venture through the canyon by water, in 1869. The Smithsonian first published, in 1875, his classic book, *Exploration of the Colorado River of the West and its Tributaries.* Powell of course went through in a rowboat, and it seemed to me that I might get a better notion of what the river had looked like to him if I took a rowboat, too. It turned out that there was not the slightest problem with survival; the voyage was so fascinating that I made it again last year, when I took some notes on the state of the river for this mag-

The author is a former writer for Time-Life Books. *Besides probing the canyon, he has written short stories, articles, poems and six books. The photographer is a professional oarsman.*

azine, which concerns itself with the same sort of things that interested Powell.

River trips begin at a place called Lee's Ferry in northern Arizona near the town of Page. Here the boats and rubber barges are launched for the journey downriver through Grand Canyon to Lake Mead. At Lake Mead the craft are hauled out and trucked back to Lee's Ferry to begin another trip. Drifting with the current, a small boat carrying an oarsman and three or four passengers can make the voyage in a little less than three weeks. Motorized barges, which in the past have been loaded with as many as 30 people, can get through in eight or ten days. The faster the trip, the more profitable for the operators.

There are about 20 companies in the river-running business. Many use military-surplus rubber bridge pontons, barges and motors; a few have medium-sized rubber rafts and oars; only one, a small company called Grand Canyon Dories, has wooden boats. The president and chief carpenter is an unusual man named Martin Litton. He makes his living as a journalist, photographer and lecturer, and in his spare time serves as a trustee of the National Parks Association. Lately he has completed a term as a member of the board of directors of the Sierra Club. Litton's profits on his dory business are invisible, but he takes delight in showing the canyon to other Americans, who are co-owners of the real estate.

Although I had seen pictures of Litton's specially built boats, I was still startled by the sight of the craft in which I had contracted to ride. It was only about 16 feet long, flat-bottomed and made of marine plywood. Major Powell's boats were 21 feet long, round-bottomed and made of heavy oak, and *he* nearly drowned on several occasions. But Powell had not known what to expect in the bottom of the canyon. Indians had assured him that his boats would be crushed to kindling, or caught helplessly in the current and swept over waterfalls 100 feet high, or that the river itself never emerged from the canyon but plunged straight to hell.

Prudently, Powell had boats designed as strong as men could make them. In contrast, Litton's boats, however light, were made with a great deal more experience in mind. For all their shortness, they have nearly seven feet of beam and draw one foot of water. They are, in effect, double-ended. They have watertight compartments for stowing food and rubber bags containing passengers' gear. Barring a really explosive collision with a rock, they are unsinkable.

The craft travel in little fleets of four or five, with a paid boatman and four passengers in each. The passengers include a fairly high percentage of doctors, amateur naturalists and professors. On each trip there are usually two or three children as young as 12 or 13, and there appears to be no upper age limit.

Calm introduction at Lee's Ferry

The Colorado at Lee's Ferry is calm, with a current of only three or four miles an hour. The boats drift downriver—oars are used chiefly for steering, not propulsion—and the cliffs begin to loom on both sides: Kaibab limestone, which is cream-colored, buff Toroweap limestone, white Coconino sandstone, maroon and red Hermit shale, red Supai sandstone and then Redwall limestone. As each formation emerges at river level, it seems to push the others upward, and soon the cliffs rise 2,000 feet. The canyon here, and for the next 60 miles to the junction of the Colorado and the Little Colorado, is quite narrow, only 200 or 300 yards wide.

Riding on the river, passing close to the carved and polished walls, one can grasp the power of the Colorado as a cutting tool. It is an almighty rasp that has cut its way down through a mile of stone and is still cutting. Today it is restrained by Glen Canyon Dam and no longer carries the immense tonnage of boul-

In a placid stretch, dory explorers can observe awesome formations dating back two billion years.

ders, rocks, pebbles and silt that once served as the teeth of the rasp. But even now, when there are flash floods on the high plateaus, cocoa-colored gully washers come roaring and rejoicing down the side canyons and the Colorado receives a fresh supply of abrasives. The rapids in the river are created by these side-canyon floods. Perhaps once a century—the last violent flood occurred in 1966—boulders as big as houses will be spewed out into the bed of the Colorado, and a brand-new rapid appears that will last until the river, in its own time, files it smooth.

The view constantly changes. The boats, slowly turning as they drift, point sometimes toward a piece of abstract stone sculpture close at hand, sometimes toward some high, cool, distant promontory, green with pines. At river level the almost frightening age of the Earth is revealed. There are folded, tortured, metamorphosed rocks in the deep gorges, the Brahma and Vishnu formations, that are among the oldest exposed anywhere in the world: two billion years. At such depths a man senses, in a phrase of Herman Melville's, "God's foot on the treadle of the loom." The deepest solitudes and most profound reveries lay hold of a man—and, like as not, just when he thinks he is about to grasp an inmost secret of himself or the Earth, along comes a baloney boat.

Baloney boat adventurers

Baloney boat is the term for the big motorized rubber barges with their tautly inflated pontons, up to 37 feet long and three feet in diameter. As one bears down on the drifting dories, the sound of its motor changes from buzz to snore; there is a whiff of exhaust smoke and a glimpse of a row of startled barge passengers snatching for their cameras. It is hard for them to believe that the little boats are actually going downriver through the rapids, and often one of them shouts, "You've *got* to be kidding!" Soon the baloney boat passes out of sight around a bend. Their passengers must forego the use of two of their five senses. Although the big rapids are almost loud enough to reach the late Major Powell, the exquisite small sounds —the song of a canyon wren or the splash of a beaver— are all drowned by the noise of the motor. And as for the local fragrances, a man who spends a week in a baloney boat will find that after that time even his wife smells to him like a gasoline station.

The first of the major rapids below Lee's Ferry is called Badger Creek. White-water boatmen have a scale for rating rapids: One to ten, according to their violence. A number one rapid is only a riffle; two and three are light; four, five and six are medium but can make a boatman cock his ear; seven, eight and nine are thunderous and demand rapt attention; and ten is quite enough. There are a few rapids that are ranked beyond the end of the scale, at ten-plus, and these are spoken of as "not recommended."

Badger Creek is a fair introduction to white water. It has a rating of seven, contains boulders 15 feet in diameter, and growls a good deal. I expected a moderately rough ride and certainly to get wet, but the boat boomed through Badger in 30 seconds without taking aboard more than a bucket of water.

Below the rapid Litton pulled into a rock-strewn, sandy beach to make camp for the night. Although there are a fair number of campsites beside the river where as many as 35 or 40 people can spread their packs in relative privacy, the sites are under constant pressure and in midsummer the best ones are used almost every night.

Not much debris is left behind, but even a cigarette pack is too much. In the depths of the canyon, despite the presence of the river, the air is extremely dry. In winter as much as 15 feet of snow may accumulate on the North Rim while not one flake reaches the bottom. In the dryness a cigarette butt or a piece of toilet paper may be preserved for years. In 1906 the clothed, mummified body of a prospector was found on a rock slope in the inner gorge. There was a six-year-old newspaper in his pocket, nearly as fresh and crisp as on the day it was printed. No one has found a mummified prospector lately, but the campsites do accumulate litter that piece by tiny piece—burned matches, filter tips, scraps of plastic—seem scarcely worth the bother to pick up, but in their long-preserved totality become highly obnoxious.

Opponents of baloney boats, both among park rangers and river-runners, contend that there will be less litter when the motors are gone, if only because there will be fewer people on the river. Moreover they believe that many of the barge riders are glad to be hustled through the canyon at top allowable speed to collect the experience, while those who wish to spend nearly three weeks taking the river on its own terms are of a somewhat different nature. They carry their burned matches and filter tips away.

Powell couldn't pick campsites

In any case, there are not *that* many good campsites beside the Colorado. Major Powell was a notoriously rotten selector of sites and when he picked a place to camp, his men often groaned aloud. One wrote bitterly in his diary: "If I had a dog that would lie down where my bed is made tonight, I would kill him and burn his collar and swear I never owned him."

About 75 miles below Lee's Ferry is Hance, a big rapid whose noise is strong enough to make a man's chest vibrate like a drum. In some ratings Hance is

placed off the scale at 11, but by the time a voyager reaches it he has had ample opportunity to observe the hydraulics of the river. When the channel narrows between cliffs, water is thrown toward the center, and there may be a wild pileup in which waves come at the boat from right, left or both at once in a herringbone pattern. Sometimes there is a pressure ridge along which the boat will slide for a moment and then fall off. At the foot of large rapids there are often eddies or reverse currents. A boat caught between currents can spin with startling speed. Sometimes the river boils up in domes 40 feet across and three feet high; at other times it forms whirlpools five or six feet deep.

In approaching a major rapid a boatman aims for the tongue, a v-shaped chute of water, pointing downstream, which contains no waves, rocks or other obstructions. It leads to deep water. At the bottom of the tongue, where the river thunders among the rocks, the boatman does his best to follow a course—usually preselected from a vantage point on shore—that will best get him through the uproar. He stands up in his boat and guides it into position with little tugs and shoves. Then, sitting down at the last moment, he rows stern first, pulling against the current to slow his speed and see where he is going.

I had already developed considerable admiration for the design of the dories, but in Hance Rapid I realized that they belonged in the highest class of wooden objects, along with Conestoga wagons, cranberry rakes and violins. The boatman did everything right, and *still* the boat was filled to the gunwales with water. The waves were too large, fast and unpredictable to dodge. The oarsman, the other passengers and I were all waist-deep in the Colorado, booming along at about 20 miles an hour among the rocks, and yet the boat remained upright and plunged safely onward, doing exactly what it was created to do.

Samuel Johnson once remarked, "Depend upon it, sir, when a man knows he is to be hanged in a fortnight, it concentrates his mind wonderfully." And in Hance Rapid, although I saw with some clarity that these dories bordered on works of art, I also understood fully that sooner or later one was going to flip over. No boat can survive the Colorado indefinitely.

I found that Litton had overturned in the rapids at least 15 times. The danger of drowning is very small, for park regulations require that everyone wear highly buoyant, wraparound life jackets. I found that I could live with the thought of being thrown into a rapid. I even imagined that I could see where it would happen: Lava Falls, the worst on the river, more than 100 miles downstream from Hance. I was not *obliged* to ride through Lava Falls. At a few such major rapids, passengers are asked to get out and walk along the bank,

Battling the thundering catastrophe of Lava Falls, a wooden boat survives on skill, not horsepower.

either because the boats must be lightened or because the rapids appear to be rougher than usual.

When we reached Lava Falls, after another ten days, I was cornered again by logic. Litton suggested that I walk—indeed pressed the option on me rather strongly. Almost everyone else was walking, he said, adding that he would not dream of going through the rapid himself if he were strong enough to carry the boat around it. But I was involved with writing that book, and I thought I should also take this ride.

Litton and I got into the boat about a quarter of a mile above Lava Falls. He was rowing and I was sitting in the stern, hanging on to the gunwales. Neither of us spoke; our voices would have been inaudible anyway in the thunder of the falls.

We went into Lava Falls at what seemed the perfect place and angle, but suddenly the boat plunged down into a hole and then pitched almost straight upward, standing on its stern. As the water broke over my head I saw Litton still rowing, his oars sawing the air. My next vision was of a wave engulfing us from the right, and when my eyes cleared and I could breathe again I saw that he had been swept overboard.

The oars were still in the rowlocks. I moved into his place and took them, glancing hopefully right and left in the foam in search of him. Soon he bobbed to the surface, seized an oar that I held out to him, and pulled himself up to the gunwale. But his bulky lifejacket prevented him from climbing back into the boat, even though it was swamped and riding very low. After a few moments he told me to try to beach the boat on the right bank; he would float along and make his way to shore by himself.

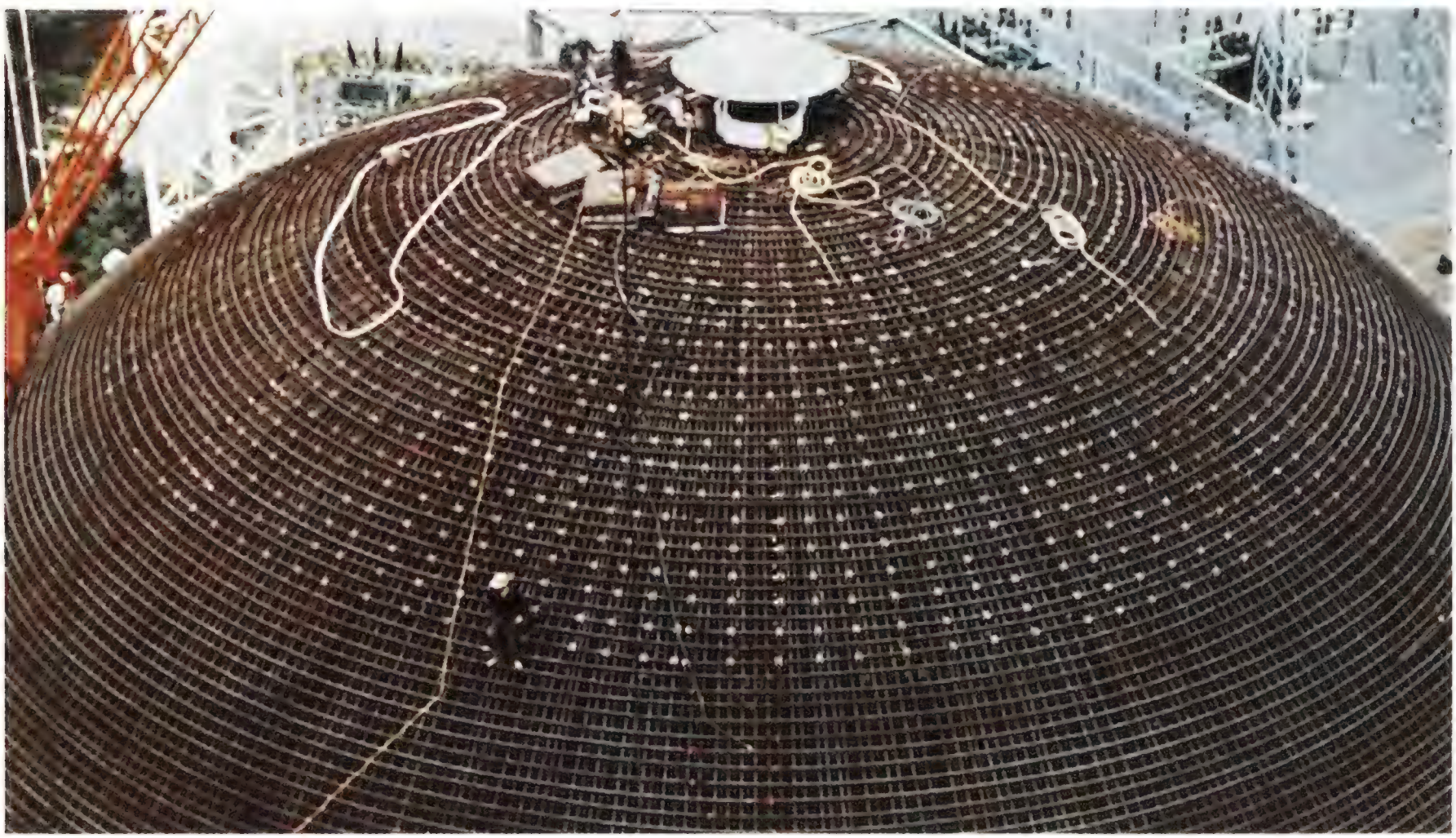
Empty, the boat weighed 500 pounds. Full of water, I could barely move it across the current and several times it bounced off rocks that a more competent boatman would have avoided. But at last I beached it, tied it to the roots of a tamarisk tree and sat on the bow, panting. Nearly ten minutes later Litton, who had been swept far downstream, came sauntering up the riverbank toward me. He grinned broadly. "Pleasant day," he said.

That was in 1971. Last year I found myself once more at Lava Falls, standing above it, while a boatman offered advice: "I wouldn't ride through there if I were you." And I didn't. I walked.

What some people are doing to help ease the electric power shortage

The development of breeder reactors is a major goal of the electric power industry. Breeders will create more fuel than they consume. This 87-ton steel forging by Bethlehem is one-half of a head for a sodium-cooled reactor vessel being built by Combustion Engineering, Inc. for the Advanced Reactors Division of Westinghouse. The project is the Fast Flux Test Facility being built by Westinghouse Hanford Company under a contract with the Atomic Energy Commission.

Pennsylvania Power & Light Company is adding two steam-turbine-driven generators to its plant on the Delaware River near Martins Creek, Pa. These will bolster its capacity by 1,600 megawatts when completed in 1977. Bethlehem fabricated and erected the structural steel for this major plant expansion.



Eleven New England power companies shared in the construction of the Maine Yankee Atomic Power Plant in Wiscasset, Maine. Capable of generating 855 megawatts, this nuclear complex was completed about a year ago. Its output is feeding into Maine's expanding economy, while providing back-up energy for the New England power grid. Bethlehem reinforcing bars and structural steel were used in the reactor containment building.

Bethlehem BETHLEHEM STEEL *STEEL IS PART OF THE SOLUTION*

Household trash, about 15 percent of it bottles and cans, is fed onto conveyor belt of an experimental machine in College Park, Maryland. Several key steps in sorting it are shown in following photographs.

Photographs by Ross Chapple

By Jane Stein

Plans are piling up to handle bottle and can problem

Bizarre trash-sorting machines are clanking into action, but recycling is not the only way out from under the mountain of containers

Thirsty Americans drained beer and soft drinks from 80 billion bottles and cans last year and threw away three-quarters of these containers—enough to build more than ten stacks to the moon. Virtually omnipresent in the landscape, bottles and cans may comprise more than two-thirds of the nation's litter by volume. Moreover, the number of beverage containers continues to grow faster than the beverages themselves. Between 1959 and 1969, the amount of beer and soft drinks consumed in the United States rose 29 percent while, under the slogan "no deposit, no return," the number of containers used rose 164 percent.

The primary issue that has emerged from such statistics goes beyond the problem of litter, that post-Earth Day rallying cry that sent hordes of schoolchildren into the streets to pick up the mess. The issue is the *use* of resources.

There have been persistent suggestions that U.S. dependence on imported metals could lead to dangerous crises. For example, the United States imports vast quantities of bauxite, the ore from which aluminum is produced. According to Interior Secretary Rogers C. B. Morton, there is "no reason why the group of countries that supplies most of our bauxite can't get together the way the oil-producing countries get together on the price of oil." Some bauxite-producing nations have recently discussed doing just that. Last year, after two years of pondering what the United States should do about the production and use of raw materials, the National Commission on Materials Policy called for conserving materials through accelerated waste recycling.

Yet recycling—the making of new products out of secondhand materials—does not seem to be the complete answer to the beverage container problem. According to Eileen Claussen, an officer in the resource recovery division of the U.S. Environmental Protection Agency's Office of Solid Waste Management Programs, no matter how good the recycling of materials is, it is not as good environmentally as "source reduction." Every production system causes some environmental impact, she argues; using refillable bottles, for example, causes less air and water pollution, generates less solid waste, consumes less energy and uses fewer resources than does manufacturing a new can or bottle for each drink.

According to EPA, the beverage container industry accounts for about 0.6 percent of the total national energy consumption. Switching to a nationwide system of refillable bottles, they calculate, would save about 50 percent of that energy (based on an estimated average of five trips per bottle.) Put another way, some five percent of the nation's homes could be heated with the energy presently wasted in producing throwaway beverage containers.

The container industry has long preferred to see the problem as one of litter. For more than 20 years, the bottle and can manufacturers have worked together in an antilitter organization called Keep America Beautiful, Inc., which proclaims that "People start pollution. People can stop it." KAB continues to ask consumers to dispose properly of the no-return con-

After trash has been shredded, it passes beneath magnet (with arrow) which lifts out ferrous metals.

tainers it promotes. While blaming the consumer may work in helping to clean up litter, it has very little beneficial environmental impact of any other kind. The disposables still have to be buried along with other solid wastes (beverage containers make up seven percent of the 125 million tons of annual waste), and resources still must be mined and processed to create new cans and bottles.

At the urging of national and local environmental groups, there are already some 1,000 community collection centers across the country and some one million people recycle trash regularly (but that accounts for only a small fraction of the bottles and cans that are produced). The manufacturers are, however, beginning to take a role in recycling efforts. The Aluminum Association has helped set up another 1,200 collection points across the nation, paying ten cents a pound. It estimates that one out of every six aluminum cans produced is returned through the system.

Steel can manufacturers claim that they can "remelt every can made," but their 80 recycling centers collect less than 0.1 percent of all cans produced, according to a report by the Council on Economic Priorities. And glass manufacturers, with some 100 collection centers, retrieve about a billion of the nearly 40 billion bottles and jars manufactured annually.

One reason for the manufacturers' growing interest in recycling is energy. Aluminum cans are recycled with just five percent of the energy it takes to make them initially. Recycled glass melts faster and at lower temperatures. To produce a pound of steel from scrap requires one-fifth the energy needed to produce it from iron ore.

Jane Stein has written frequently for SMITHSONIAN *on such subjects as thermal pollution, the gasification of coal, and energy conservation and architecture.*

In a scene that is vaguely reminiscent of "Clockwork Orange," the trash tumbles through a cylinder

What isn't generally known is that most bottle and can manufacturing processes already include internal recycling—melting down glass containers that fail to pass quality inspection, or using steel wastes generated right at the mill. Roughly 50 percent of all steel is manufactured from scrap created by internal processes.

In glass manufacturing the addition of waste glass, called cullet, is so useful that if none is available from rejects or trim waste, the factory will intentionally produce it. But cullet must be sorted by color, and be free from metal and other impurities—problems now being worked out by experimental sorting machines. The

called a trommel. Pieces of glass and other trash three-quarters-of-an-inch wide fall through the mesh.

percentage of cullet used in all glass products varies from 8 to 100 percent, with an average of 15 percent. But the combined recycling efforts of citizens' groups, industry collection points and bottling operations account for only a small percentage of this figure—little more than one percent of all cullet.

Interest in recycling is growing—ahead of technological and economic capacity. Municipalities are usually slow to change—in this case, to change their methods of handling trash. More importantly, the technology for large-scale recycling is not ready for municipal use. The manufacturer of one of the most advanced resource recovery systems has said: "A realistic estimate of the time needed to set up recovery systems in most metropolitan areas would be ten years."

The present technology consists of a series of shredders, grinders, scanners, screens and electromagnets, all of them operating in Rube Goldberg fashion, with mechanically operated arms, spindles and trays doing various jobs of sorting out ferrous metals, aluminum and glass. (One such process being operated experimentally by the Bureau of Mines in College Park, Maryland, is illustrated in these pages.)

First, the shredding process

In all such machines the first step is always the shredding operation. Refuse is fed through a conveyor to a giant machine which chews up large chunks of waste and spews them out. Shredding is necessary for the sorting stages, because it makes it possible to separate the materials more thoroughly: A magnet might attract a whole steel can, only to find it stuffed with banana skins in a paper bag.

Heavier waste materials are ejected from the bottom of the shredder and passed through a magnetic separator that plucks out all ferrous materials. Atlanta has used magnetic separation for more than 35 years, and manages to recover more than 99 percent of the 100 million steel cans in its trash each year.

Glass is initially separated out through a process of air classification: A column of air separates items by weight. Glass and metals, for example, fall together as heavy materials, while paper and fabrics fall together into a lighter-materials pile. An optical scanner sorts out the glass by color, much as similar machines used in agriculture sort out ripe from unripened cherries. The sorter can handle 12,000 one-inch, or smaller, pieces of glass a minute.

A conveyor belt carries the remaining wastes over an electrostatic field which separates the aluminum from other wastes.

What is left are combustibles and noncombustibles. The noncombustibles include nonferrous metals such as copper and zinc (usually in very small quantities), as well as dust, sand, rocks, bones and ceramic materials. The remainder—food, paper, plastic, rubber, rags, wood—can eventually be incinerated or, better yet, burned as fuel. Chicago's Commonwealth Edison plans to pay the city $700,000 annually for its garbage, which will produce 5,000 to 6,000 British thermal units (BTUs) per pound, enough power to light 45,000 homes. Burned in a mixture of one part trash to nine parts coal, the garbage will replace 100,000 tons of coal a year. The ash left from burning, including the crushed noncombustible materials, amounts to some five percent of the original trash.

Like snow in reverse, small pieces of paper are drawn up through air separator and cling momentarily to the sides of the ducts, leaving at bottom a neat and shining trayful of glass, wood and metal fragments.

The kind of total system that has just been described does not yet exist. Most of the components have been designed, however; some are experimental and some are in use. For the past three years, a solid waste recovery plant in Franklin, Ohio, has been processing 50 tons of garbage a day, recovering papers and magnetic metals, and more recently sorting out glass and aluminum. In other places across the country—Delaware, and San Diego County, California, for example—demonstration plants are planned which will yield fuel oil along with aluminum, steel and glass.

Another industry approach is the time-honored one of building a better mousetrap. Recently a large chemical company announced a new material for making bottles. Made from otherwise unused products of fossil-fuel processing, it is transparent, light as aluminum and, the company claims, causes far less pollution to make. It can be refilled, it can be recycled with a low amount of energy, and when this wonder bottle finds its way into an incinerator, its own fuel content will permit less fossil fuel to be used for burning. The new material may be in use in a year.

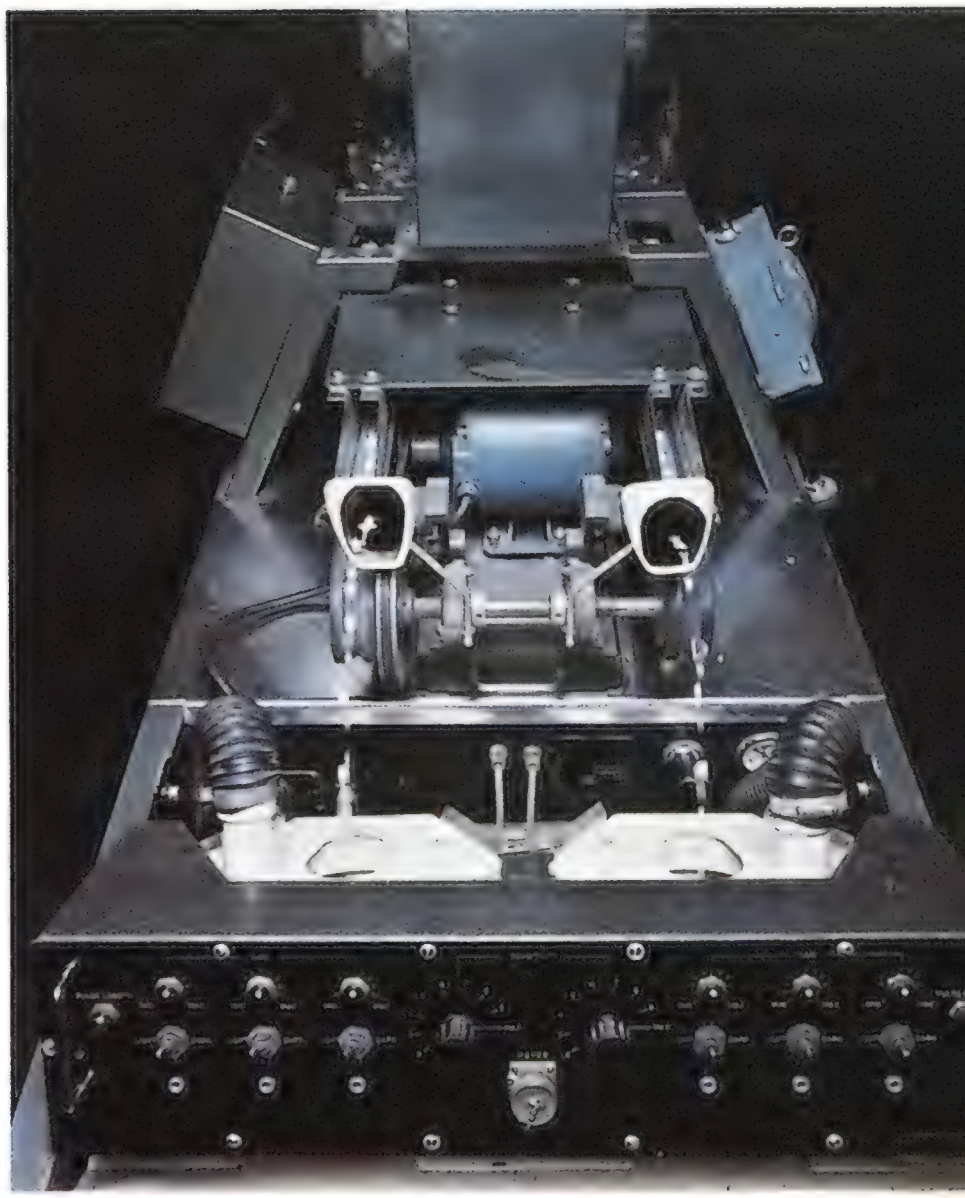
A problem of economics

It is the economics of large-scale recycling—not the technology—that is most troublesome. To break even, a resource recovery plant should have a capacity of about 500 tons of trash a day—an amount equivalent to that produced by a city of 250,000 people. This exceeds the plant size of most units planned.

Finding markets is also a headache. The aluminum industry is eager to buy back clean, shredded aluminum, since it is not only interchangeable with primary alloy for most purposes, but is also cheaper.

The economics are totally different for steel and glass. Glass cullet—cleaned and sorted by color—costs at least $30 a ton, while raw materials cost only $16 to $20 a ton. Aside from its use in the factory, there is not much demand for recycled glass. Researchers at the University of Missouri at Rolla have experimented with an aggregate called Glasphalt, in which crushed waste glass substitutes for crushed limestone. While test sections of road have been paved with this material at some 15 locations in the United States and in Canada, it could never compete seriously in volume with regular asphalt. Limestone is both readily available and inexpensive. In addition, according to EPA, even if all the glass containers used in the United States were converted to Glasphalt, there would be only enough to lay down a maintenance layer on about 300 miles of four-lane highway each year.

The economics of recycled steel are also shaky. At the resource recovery operation in New Castle, Delaware, for example, it currently costs about $60 to isolate one ton of steel cans; their market value is only between $10 and $24. (The chief market for recycled steel cans is the copper industry—for a leaching process to produce copper—but it is estimated that only some four percent of steel cans in municipal wastes are "mined" by the copper industry.)



Much like a mechanical face weeping tears of glass, this part of machine ejects twin streams of half-inch pieces of glass. "Eyes" are actually mirrors that enable staff to monitor flow of glass into tiny holes.

And that is not all. Depletion allowances in the tax laws discriminate against scrap in favor of raw materials. Freight rates for shipping recycled materials, set by the Interstate Commerce Commission, are often more than 50 percent higher than those for comparable primary materials. So recycling efforts proceed slowly and the cans and bottles keep piling up—though not in Oregon.

Since October 1972, the sale of beer and soft drinks in nonreturnable cans and bottles has been outlawed there. Now, customers regularly plunk down a two-cent deposit for standard bottles that can be refilled by more than one bottler, five cents for other containers. Pull-tab and pop-top cans are banned altogether.

The bottle and can problem

How it is all working out is a matter of continuing controversy. Based on preliminary reports, there has been a "distinct and positive impact" on litter, says Eileen Claussen. Oregon Highway Department surveys conducted before and after the law went into effect (and which are contested by the beverage-container industry) indicate a reduction in beverage container litter of as much as 84 percent. Before the new law, a state survey found beverage containers to represent 62 percent of the total volume of litter. "It has practically eliminated litter of this type on roadways, in parks and on forest trails," a state spokesman said. "For those who still throw containers out—and there are darned few any more—there's someone right behind them picking them up for the deposit."

EPA sees another environmental effect from the bottle bill. Assuming 15 trips per bottle, the Oregon law saves an estimated 3,000 billion BTUs—equivalent to the home heating needs of 24,700 housing units.

Before the law went into effect, industry opponents predicted great economic disruption and pockets of unemployment. Since more than half of the cans produced nationally are beverage containers, the can industry as a whole stands to lose out in a nationwide switch to returnables. Cans, which cannot be refilled, were all but driven off the shelves in Oregon, declining from 41 percent of the soft-drink market and 35 percent of the beer market to less than one percent of each. One canning plant was closed—laying off 70 persons—but it now plans to reopen with a smaller number of employees. On the other hand, there were job gains in the bottling industry, virtually equalizing the employment picture, EPA points out, except that there was a general shift from high-paying to low-paying jobs—and that is ominous news for workers in the canning industry.

Retailers have been hard hit. One local supermarket chain estimates that it will have to add an average of one-and-a-half employees at each store simply to handle the flood of empties. A nationwide chain predicts that they will have to pay out more than $1 million in direct labor costs in Oregon.

Industry claims that while some litter has been controlled, the ends achieved have not been worth the costs—and points to the rising prices of beer and soft drinks. While some of the price rise is certainly attributable to the bottle bill, there has also been a local price increase in the ingredients of the drinks. In any event, maintains Claussen, the price of returnables will still be about half a cent lower than the current price of nonrefillables. We have long paid extra for the privilege of throwing our bottles and cans away.

Nationwide, nearly every state has had bottle legislation pending. Washington state narrowly missed passing a bottle bill a few years ago, and last summer a container deposit law went into effect in Vermont. On the local level, a handful of cities have managed to get mandatory deposit legislation, but they have mostly been held up in legal battles and the laws remain unimplemented.

The Environmental Protection Agency would like to see a nationwide system of using refillable containers, plus the development of a recycling capability to handle bottles once they have made their maximum number of trips to customers. Industry disagrees with EPA, warning that "proliferation of the Oregon law would be extremely harmful to the country." On Capitol Hill, support seems to be growing for bottle legislation. Oregon Senators Mark Hatfield and Robert Packwood have introduced legislation modeled on the Oregon law (and have been joined by non-Oregonian sponsors). And according to Leonard Bickwit jr., counsel for the subcommittee on environment of the Senate Commerce Committee, energy problems are contributing impetus: "The energy situation has made people more aware about wastes and about conservation. Recycling and materials conservation of beverage containers is analogous to going to smaller cars for fuel conservation."

When the Oregon bill went into effect, the Oregon Environmental Council, held a mock funeral. The tombstone read: "No Deposit. No Return. Born circa 1935. Died in Oregon on September 30, 1972. May it rust in peace."

From the chaos of the throwaway culture comes order: Glass is in foreground, ferrous metals at left, with aluminum fragments at right. Beyond are unchewable metal objects plus collections of paper and garbage.

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Botany student Jennifer Smith collects litter from one of 40 traps in a beech grove, part of a study of the energetics of a forest system. The table behind her catches falling twigs.

Text and photographs by William Vandivert

An English wood, 'most studied' by the ecologists

A quarter-century of ground-breaking research has made Oxford's Wytham Woods a world capital of ecological study

The stretch of the old coach road that runs through Wytham Woods is called "The Singing Way"—nobody quite knows why. As it climbs from the water meadows of the Thames past old Marley Wood, the road rises from a bed of Oxford clay through rich, sloping fields underlaid by limestone. At the crest the road lies firm on a hard limestone cap of coral rag whose convoluted forms show the shapes coral grew into under a warm Jurassic sea. Down the slopes on either side you see imposing trees and the mixed growth of a lush deciduous forest, broken here and there by a grassy common.

Wytham Woods is much like a number of pleasantly aging 19th-century woods in England, except that its 1,000-acre expanse is probably the most studied and best understood woods in the world. In 1943 Oxford University received Wytham Woods as a gift, on condition that "every care be taken to preserve the woods in their present state of natural beauty" and the University "use them for the instruction of suitable students and provide facilities for research." At the same time the University was enabled to buy the rest of the 3,000-acre estate, including Wytham Abbey and the village of Wytham from the donor of the woods, Mr. R. W. ffennell.

It was along the Singing Way, after 1947, that Charles Elton, a founder of modern ecology, undertook his groundwork of dividing the natural world into habitats and listing their animal populations. In the intervening years the concept of habitats has become a cornerstone of ecological knowledge, and

Seen from the air, Wytham Woods (with the abbey at top) gives no hint of intense activity within.

Wytham Woods has become one of the meccas of ecological research.

The study of habitat is only one of the lines of remarkable research carried on in Wytham Woods in the last quarter of a century, research that has contributed not only to our basic understanding of ecological principles and concepts, but also to practical solutions of problems confronting man in the management of natural systems.

In the mid-1930s Elton had become Reader of Ecology at Oxford—a prestigious post with no little independence. There he founded and directed the Bureau of Animal Population. The staff was drafted into rodent control in World War II, but with a return to peacetime routine he started classifying habitats in Wytham Woods.

Elton had studied wood and field, tundra, pond and marsh throughout the world. But Wytham now provided an unparalleled area only minutes from all the resources Oxford University could provide. Night and day, in several hundred field trips a year, the Wytham ecological survey grew.

Much of the fieldwork involved collecting, noting and rechecking just where each creature lived. But Elton's notebooks evoke more than just a record:

> 17 April, 1943: In the clear hot sun-shafted space of the air among the tall sycamore coppice with its mercury carpet, there were here and there hovering bee flies, usually at six to eight feet. One was taken.
>
> 29 May, 1952: From Lord's Common I pushed through the southern patch of it (where I noticed a small wayfaring tree) into the great swell of limestone field that lies between Brogden's Belt and the Singing Way. From here is a very noble and far view across the Park . . . the bugle (*Ajuga reptans)* was being visited by three kinds of bumblebee. Here I caught an Asilid fly on the bramble-bracken, 3 ft., 5:45 A.M.

By 1954 he and a colleague, Richard S. Miller, now at Yale and the incoming president of the Ecology Society of America, had argued out reasonable divisions of the living world and then published the final concept. The resulting classification of habitats is orderly. It looks, on the face of things, to be as simple as the squares on a chessboard. But, since each habitat edge is an important interface, they come into the scheme, too. And then there are "qualifiers" that add to the permutations in pinning down a habitat. The scheme has all the complications of three-dimensional chess. There are far more players and possible moves than in con-

William Vandivert, who wrote of and photographed New York subway graffiti (SMITHSONIAN, *February 1973), has a part-time home 15 miles from the Woods.*

First-year biology students from Oxford examine what they have caught in their traps.

ventional chess, as well. At least 5,000 species of animals inhabit Wytham Woods; more than 3,800 have already been identified.

Applied to Wytham, Elton's classification uses mostly the "Terrestrial System," composed of *Open Ground* with cover up to six inches high; *Field Type* with vegetation not above six-feet high; *Scrub* with an upper limit of 15 feet; and *Woodland* with a canopy 50 feet high. *Topsoil* and *Subsoil* are other habitats. A few ponds provide an *Aquatic System;* around them are *Aquatic-Terrestrial* transition areas; and there is the *High Air* where birds, larger insects and tiny insect aeroplankton invaders are found.

A second line of research began at Wytham at the same time as the survey. The woodland's protected expanse gave shelter to three population studies that dug deep into little-known lives.

Insect defoliation of the oaks that formed much of the tree population of the Wytham woodland was often severe enough to slow tree growth and bring pain to foresters. But to the great titmouse and other birds, which fed their young on insects, a big caterpillar year was a bonanza.

In 1947, David Lack, new to Oxford as head of the Edward Grey Institute of Field Ornithology, undertook a protracted study of the population dynamics of great tits. He wanted to know what regulated the population of these birds: Was the determining factor the availability of food, or was it the birds' own social behavior, particularly their territorial requirements? (The issue is unresolved to this day. Lack, who died last year, believed food supply was the regulator; others contended, and still do, that behavior determines the birds' population.)

He carefully recorded their territorial behavior in the spring, breeding time, egg size, predation on the nests, the body size of fledglings just before they left the nest, and their dispersion afterwards.

The tits were not the answer to the problem of the oaks. While automatic cameras have recorded that it takes about 700 insects daily to feed a nest of fledglings —mostly caterpillars from the oaks—tits hardly dented the hordes.

There were good feeding years and poor years, fat babies and skinny babies, yet the tit population stayed fairly steady. Each year the families averaged between nine and ten apiece. If all the fledged young had survived, their numbers would have been far more than the habitat could handle.

When they leave the nest the young tits disappear into the treetops where they become almost impossible to follow. Lack learned that the caterpillars pupated and were gone shortly after the young tits began to feed themselves. And one grim fact he well established! Only one in ten of the youngsters survived the winter. Further years of study showed that each pair must re-

place itself during its lifetime—and that's all—to keep the adult breeding population level. In a territory overpopulated by one species, the weakest die—they are simply scratched from the ecological balance sheet.

Work on the great tit population still goes on. Each breeding season Lack's successor at the institute, Chris Perrins, and his research assistant move through the woods to climb the trees and check nest boxes, count eggs, band and weigh young.

In 1948, Dr. George Varley, the new Hope Professor of Entomology, chose the winter moth for study. Its caterpillars are one of the two most common of about a hundred different oak-leaf-eating larvae. If all the 150 eggs a single winter moth can lay survived and multiplied, Wytham would have no oaks. Again, the question was: What checks held the numbers down? One great oak can harbor half a million insects, but there are limits.

To find out, Varley set traps on a quarter of the trunk's circumference to census females as they climbed the tree to mate and lay their eggs on oak leaf buds. When the larvae hatch they eat the buds, then the leaves as they fill out, until in a few weeks oak tannin renders the leaves inedible. Finished eating, the caterpillars drop on a silken thread to pupate in the ground below the tree.

There proved to be a number of controls of winter moth population. The coarse control is that if they hatch too early, they starve; if they hatch too late, leaves are too tough to eat. The fine control occurs when greater numbers pupate. Then their natural enemies, a number of predatory beetles and Wytham's two resident species of shrews, find hunting easy and scythe the numbers back fiercely. Next year the larvae crop is reduced to what oaks can tolerate.

In any animal community, weather can change things drastically. In the winter of 1946-47 six weeks of black frost struck deep in Wytham Woods. Then heavy snow fell knee-deep and crusted. Mice and voles tunneled below the forest floor. Owls hunted with poor success. It was in this cruel winter that H. N. Southern, senior research officer of the Bureau of Animal Population, began to probe the relationships between tawny owls and their prey.

One way of looking at the natural world is to visualize pyramids standing on broad bases of energy from the sun which has been fixed by green leaves. Herbivores feed on these. Flesh-eaters feed on herbivores. At the top of such a pyramid sits the carnivorous tawny owl, one of Britain's most common birds of prey.

The problem of all carnivores on pyramid points is that there is scant room at the top. Tawny owls answer this by strong territoriality. Each owl pair occupies a fixed patch of woodland and the males proclaim and defend their boundaries by hooting battles. From these hooting encounters Southern mapped each pair's territory. By spring he had delineated boundaries showing only 17 pairs in the whole of Wytham. Melting snows revealed corpses of owls killed by starvation.

"Getting around was difficult, but it was an emergency situation for owls," he says. "I've often prayed for another since, to watch again, but haven't had it."

A tawny owl ignores the cameras as it returns to the nest box with a bank vole to feed its chicks.

These tawny owl chicks are part of a study to see how they maintain a stable population.

Over the next eight years, Wytham's owl population rose to about 30 pairs and has stayed there since. Had Southern limited his study to fewer years, the true story would never have unfolded.

Southern's aim has been to discover the number of owls present each spring; the number of young and their fate; the diet of owls from season to season and year to year; and the numbers of their principal species of prey. These were mostly wood mice and bank voles during the breeding season, young rabbits, moles and even invertebrates such as earthworms and beetles during summer when they were plentiful.

Although in some years he made more than 500 visits, he could not locate all the natural nests. Tawny owls like to nest in a hollow limb a few feet in length and 12 feet or more off the ground. So Southern devised a super-attractive nest box. It worked so well that brown-stained, limblike nest boxes with hinged doors at the rear for observation became the thing for tawny owls in Wytham. His Mark II model sported an angled mirror on a metal arm. He could shine a flashlight into this from the ground to check the brooding mother or see the condition of eggs or chicks when at dusk the mother was off feeding. Later, from a blind nearby, he would watch prey brought for food by using a red spotlight which owls were not able to see.

It soon became apparent that the amount of prey available was a key factor in owl family life. If it was a good mouse and vole year, all went well, because the male could do all the hunting. If prey numbers were down, the female had to fly off the nest to hunt, too; eggs chilled and some or all never hatched. If hunting continued poor after hatching, the weaker chicks usually starved.

Southern says, "The big surprise was to see how many pairs failed to breed. Over the whole study almost half the pairs did not. When mice and voles were at their lowest numbers in 1958, this was driven home by no breeding at all. We knew this tendency in nomadic owls, say on the tundra, but it was surprising to see it in resident owls living in the more stable environment of a temperate woodland."

He learned that a young owl when fledged can expect to live only three years; once established on a territory its life expectation rises to five years. What happens to the surplus of owls? They either starve or push from the woodland and secure a territory nearby, or live short lives seeking one.

In the quarter-century since Wytham Woods' establishment as a research reserve, some 400 scientific

papers on widely varying topics have been published on studies associated with it. Many are based on three-year stints pointed at a doctoral degree. A committee coordinates these for pertinence and continuity so that all help to achieve wider goals.

Twelve minutes from Wytham by car, in the modern science buildings of Oxford University, lie some of the best facilities a scientist could hope for. Biochemical laboratories, analytical laboratories, an atomic absorption spectrometer—all the instrumentation of today is there, with access to a computer center.

A quite different line of research is now under way in Brogden's Belt, an arc of great beeches planted early in the 19th century. Here John Phillipson, head of the Animal Ecology Research Group, which replaced Charles Elton's Bureau of Animal Population upon his retirement in 1967, leads a group of eight scientists deep in the analysis of energy flow within a woodland community. He is a front-runner among the modern natural scientists who use every scientific discipline in new approaches to ecology. He is an inventor, too, and his Phillipson Micro Bomb Calorimeter is a tool vital to these measurements.

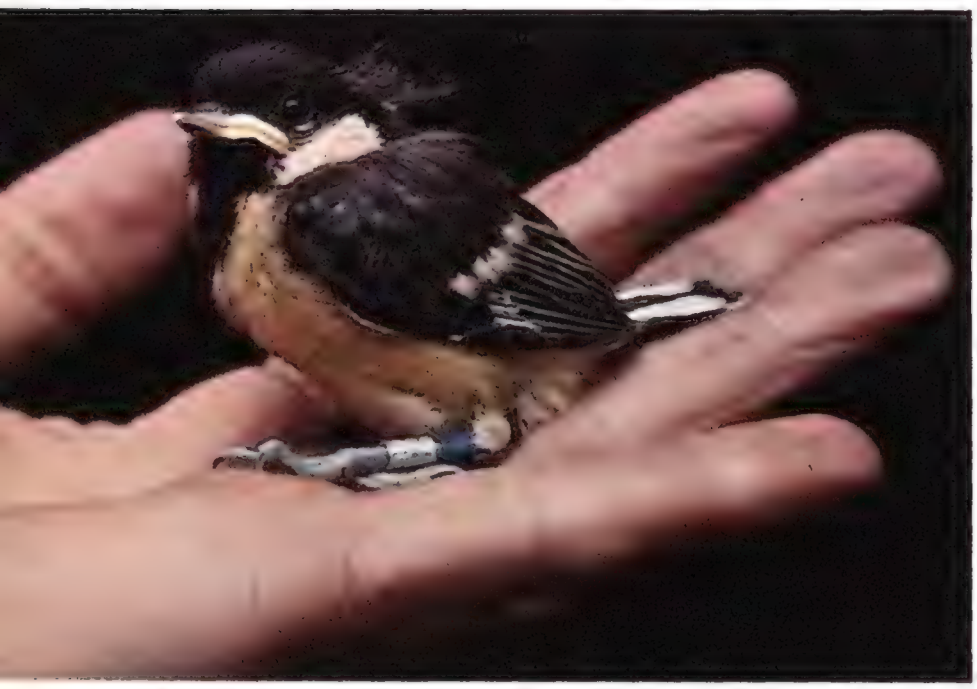
The idea behind this project is that you can estimate the energy from the sun fixed by trees and plants and converted into leaves and wood. On the principle that energy cannot be created or destroyed, only converted, you can trace this energy in calories, or a similar measure, through the creatures that live on leaves, on wood, on forest litter and then in soil. From such a balance sheet you can draw analogies that give quicker information, which can be applied to other communities or to a single creature's life.

Charles Elton pauses during a stroll along the Singing Way. He more than anyone, perhaps, made Wytham Woods a focus of ecology.

Phillipson's group laid out a grid across the comparatively clean forest floor under a grove of beech trees; they set traps to sample falling leaves, leaves blowing in across the floor and leaves blowing out, and twigs and branches falling from the trees. At stated intervals they sample all animal life from top to bottom of the study areas. Anemometers, rain gauges, thermometers and respirometers add to the record other figures needed.

Samples taken to the laboratories are handled in a variety of ways. In one, a square of frozen earth is sliced thin to be analyzed by microscope. Another uses heat on soil to drive small creatures out; still others leach and coax out more. Eventually, what is called the biomass, or standing crop of living matter, is known. Then, by taking respiration rates of samples and relating these to climatic data, they dig out the energetics figures.

Phillipson has set four years for the study. When he and those with him have finished the patient measurement and analysis, Wytham Woods will have contributed to the understanding of yet another important ecological concept.



A young great titmouse, here 15 days old, is one of eight birds and an egg that did not hatch. It probably will not survive a year.

A young badger trips an automatic camera flash, emerging from its burrow at night. Scores of unsuccessful exposures preceded this one.

By Aldo Massola

Aborigines fight for their 'dreaming' in today's world

Closely attuned to harsh nature, this mysterious race barely survived the Australian pioneers and now tries to fit into encroaching civilization

Near the entrance to Parliament House in the Australian national capital of Canberra stands a collection of tents. It is known as "the Aboriginal Embassy," for it shelters a group of native black Australians. With protests and demonstrations, they are seeking more management of their own affairs. Recently, they staged such a noisy rally when Queen Elizabeth was opening a session of Parliament that the applause was drowned.

These unusually noticeable Aborigines may have accomplished little except to stir up some white backlash. But they are a constant reminder that *two* races exist in this generally prosperous and happy nation—and that these two peoples are as distant from each other as is the tasteful facade of the Australian seat of government from the tents outside it.

When did the Aborigines come to Australia, and where did they come from? Who are they? What is their future? The answer is simple: No one knows. It has been estimated that during the Late Pleistocene

In this now classic photograph from *Life*, wild Bindibu Aborigines of the west-central desert pause to drink after sudden shower fills pool.

glaciation, between 20,000 and 25,000 years ago, sea levels were low enough so that extensive areas of land emerged between New Guinea and Australia; and this enlarged Australian continent was separated from a similarly enlarged southeast Asian mainland by relatively narrow straits. It is believed that across this land bridge came the Aborigines' forefathers.

According to another theory, however, the Aborigines were not Australia's first arrivals, but supplanted the Tasmanoids, who were already there. It has long been claimed that these people, who survived to European times in Tasmania, were Negritos or Melanesian Negroids. Members of this racial group live today in New Guinea, New Britain and New Caledonia.

Australian Aborigines do not readily fit into any of the three main divisions of mankind, the Caucasian, Mongoloid and Negroid. They have therefore been assigned to a special group, the Australoid, which also includes the Veddas of Ceylon and the Dravidians of southern India. Many anthropologists, however, consider that they represent a generalized, though primitive, type of modern man, a proto-Caucasoid; some claim that they are of three distinct types and that they arrived in Australia separately; others maintain that they are one people, and that there is no true Aboriginal type, since great variations occur.

In the southeastern part of Australia, pureblood males were medium to tall, well developed but not fat, with limbs longer and thinner than Europeans. They had a sloping forehead, protruding eye-ridges, prominent eyebrows, high cheekbones and a depressed nose with wide nostrils. Eyes were large and deep-set with dark pupils and whites (really honey-colored) veined or blotched with darker pigment.

A noted anthropologist who served as Inaugural Panel Member of the Australian Institute of Aboriginal Studies, Italian-born Aldo Massola lives in Melbourne.

The mouth was large, lips full, teeth large and strong, chin massive but receding. Hair ranged from dark brown to black and can be curly, wavy or straight; body hair was plentiful and long. Women were shorter and more delicately built, but prone to fat. Many, especially in their later years, developed a prominent growth of facial hair. The skin of both sexes is velvety, and grayish or brownish copper, darker where exposed to the sun.

In their primitive state neither sex used clothing, except in winter, when they wore rugs made of kangaroo or opossum skins. The pendant tassel sometimes worn by men, like the apron worn by women, was an ornament only worn during certain ceremonies, or corroborees. Other ornaments were opossum or kangaroo fur headbands and waistbands, opossum fur or cane armlets, a vegetable fiber or cut reed necklace and a wooden stick or bone worn through the septum of the nose.

Keloids—the scars from deep incisions which healed into prominent ridges—on shoulders and across breasts were either a sign that initiation had been completed or were displayed simply as an embellishment.

Original population was 300,000

Tribes occupied a definite territory, which was never the object of warfare. Each tribe included a number of sections, and these in turn were divided into groups, each of which led an independent life. Tribal territory varied greatly in size, depending on the availability of water and food. It has been estimated that in central parts of the Northern Territory the population density was one person to 35 square miles, while in fertile regions of the southeast it might have been one to every three or four square miles. Most authorities think that the average tribe consisted of about 500 persons, and that in 1788, when the British first settled in Australia, the Aborigines may have numbered some 300,000.

Tribal boundaries were well known to all and consisted of creeks, ranges, isolated hillocks, clumps of trees and rock formations. No man would enter another tribe's territory unless he had permission. Certain groups of one tribe might unite temporarily to raid a group of another tribe, either to abduct women, or in revenge for the spearing of one of their men. Then the invaders would retire to their own territory. Aborigines fought no wars of aggrandizement.

Hunters and food gatherers, the Aborigines relied

Jack Kelly, ancient among his people, stands in front of a mission station in central Australia.

on their knowledge of animals and the peculiarities of the plants they lived on. They evolved a philosophy which culminated in a complete, indissoluble relationship between man, animals, vegetation and tribal territory. The Aborigine was part of his landscape. It gave him birth, nourished him, supplied his material and spiritual needs. He belonged to it and could not be alienated from it. Animals and plants were part of his "dreaming" and, in an intangible way, were his kin. They were his totem, and therefore his religion, and yet he hunted them and believed that he could control their number by the performance of the proper ceremonies.

No native Australian animal can be domesticated and made useful to man; no native plant can be added to the world's larder. So the Aborigines could not settle in permanent villages and start on the long road to an urban type of civilization. As food ran out in one locality they had to shift camp to the next, and the seasons of the year saw them camped at different places. Born in their tribal territory and living on it all their lives, Aborigines knew every inch of it. Men generally left camp early in the morning and returned in the evening with whatever game they had speared or trapped; women kept the family supplied with edible roots and plants, seeds and nuts, bird's eggs, reptiles and crustaceans. Food was generally varied and plentiful. There were no animals to be feared except poisonous snakes.

Tricks of finding water

Water was the main concern. Australia is the world's most arid continent; even in the better-watered southeast there are frequent and devastating droughts. But the early Aborigines found water (probably by the simple method of silently following animals and birds) in gnamma holes (small holes in rock masses), the mouths of underground reservoirs, or by digging where they saw dingoes (wild dogs) scratch down through the sand to a "soak," a layer often several feet beneath the ground where rainwater collects.

In some parts of the southeast, Aborigines relied on water stored in the roots of a species of eucalyptus. The roots of this tree are long and run horizontally only a few inches underground. A root 15 or 20 feet long yields up to a quart of good, clear water. Another tree, a casuarina, stores water which drains into its trunk through holes at the junction of its branches. In some places the only available water was from land

Aborigines like this young father often work as stock riders on the vast cattle and sheep stations.

crab holes, reached by sucking it up through long reeds or digging down to it—muddy and smelly, but the only means of keeping alive. When drinking from muddy or slimy surface water, an Aborigine dug a hole alongside it and allowed it to filter through the intervening soil. Then, animal-like, he bent down and drank straight from the pool without stirring up the muddy bottom.

Continual moving encouraged the breaking up of the tribe into family groups who drifted apart and came together at will. All would congregate at one locality for a ceremony. The Aborigines recognized no chiefs or hierarchy of government. Each group roamed their tribal land as it pleased. However, age earned respect, and certain old men held great power which stemmed from their knowledge and experience of totemic matters. Certain old women, leaders of women's ceremonies, were also respected and feared by the tribe.

At tribal meetings, elders of each totem met in council to discuss ceremonies and punishments for crimes, but they had little authority and no pretension to secular power.

Totemism is hard to explain, but generally it means a special relationship between people and animals, plants or natural phenomena, along with a definite locality believed to be sacred to the totem species. A man regards his totem species and locality as being "one flesh" with himself. He performs ceremonies at the totem center, refrains from hurting or making use of his totem and regards its human members as his brothers and sisters to the extent that to marry one another is tantamount to incest.

This relationship binds only totem members. They have no objection to anyone else's killing or eating their totem animal, even in their presence. Ceremonies are believed to increase the totem species throughout the country and not just in the one locality. It is believed that both the food supply and the continuity of all the totems, and thus the very existence of all Aboriginal tribal groups, is dependent on each group's performance of the proper ceremony at the right place.

Ceremonial centers dotted the country in every direction. Certain ceremonies, like those reenacting the wanderings of cult heroes or totemic ancestors, could not be performed at just any center. The tracks of the ancestor had to be followed and his "act" reenacted to continue the magic that produced animals and men, rain and the orderly course of the seasons.

These far-flung visits at given intervals kept all the outlying groups, even those separated by long, waterless marches, within the tribal structure. Further, the reenactment ceremonies, being intergroup and even intertribal, maintained contact between separate tribes.

Reliance on ceremonies persists among semitribal Aborigines even in regions which have long been "Christianized." In central Australia the succession of poor and dry years, which began with the 1927-29 rainless period and culminated with the disastrous 1958-62 drought, is blamed on the abandonment or mishandling of ceremonies. Elders had died. Those who took their place were skeptical or ignorant. The sacred songs were no longer sung.

Added to the relationship between man and nature is the belief that babies come from sacred spirit centers, such as water holes or rock formations. Here spirit children arising from the "essence" left behind by totemic ancestors await the passing by of an unsuspecting woman who has previously been "made

School teacher's son "integrates" a classroom at Padunya Station school in Northern Territory.

Workers wait patiently for lunch outside an assembly point at Amoonguna Mission in central Australia.

ready" for a baby by a number of successive sexual acts. The importance of tribal land, even to detribalized but tradition-oriented Aborigines, can thus be understood. Every individual owned what he manufactured: weapons, string bags, ornaments. He also owned certain myths, dances and songs, and had the exclusive right to their recital or performance at corroborees. Men also owned their women. And all these possessions could be exchanged or loaned. Since giving a gift created the duty of returning one, it also was an exchange. If a party went fishing, the catch was divided among all present. Each man owned his share; he would not think of offering some of it since this would oblige the receiver to return the gift. The revenge which followed a man's death was an exchange—one life for another. A wife was rightly obtained only if a sister or daughter were given in a fair exchange.

Thus Aboriginal ethics were ideally suited to their manner of life. Every action was governed by strict rules which were hardly ever broken, despite the lack of authority to supervise them. The breaking of rules brought its own punishment, for it meant the severing of the mystic ties which bound a man to his universe, to his other self. Cut away from his "dreaming" by his action, he would wither and die like a branch cut off from a tree.

It was to this closely knit, orderly world that the white man came in 1788 to found a penal settlement. He brought convicts, syphilis and smallpox. He came unannounced and uninvited, thereby breaking the laws of hospitality, and his diseases caused havoc among the tribes; yet he was made welcome, and gifts were exchanged. The Aborigines probably thought that the strangers would soon go back to their own country, as the Aboriginal code demanded. But they did not go away. More came and brought sheep and cattle, and the Aborigines showed them the best pastures and the permanent water, and helped them to fell the trees to build their houses and fence the stockyards. The Europeans had brought few women; the Aborigines gave them their best looking and were recompensed with bags of flour and with sugar. To the Aborigines, this was an exchange, but the whites called it prostitution.

Soon the Aborigines were regarded as a nuisance,

and the handouts stopped or the flour was poisoned. They were ordered off the cattle runs, which often meant being turned away from the only available water. The kangaroos and the emus, the main food of the Aborigines, were decimated in organized hunts because they competed with sheep for grass and water, while sheep and cattle destroyed the edible roots, ate the precious grass seeds and fouled the waterholes. When the Aborigines retaliated by spearing the white man's animals, these newcomers organized hunts, "punitive expeditions," and slaughtered Aboriginal men, women and children.

The Aboriginal system of land tenure did not allow for a permanent invasion of their territory, and so there was no concerted resistance, no tradition of war. No Little Bighorn was possible in Australia, but there were plenty of Wounded Knees. With tribal lands and totem centers gone, elders dead, ceremonies impossible, the remnants of the Aborigines became wandering beggars, dressed in rags, verminous, victims of the white man's diseases and grog, their vacant gazes reflecting the hopelessness in their soul.

Certain religious bodies and, when it was almost too late, state governments attempted to better their condition, if only because of the disgusting spectacle of the "humpies" and their shacks on the edges of the towns—makeshift encampments frequented by the worst type of white men, who fathered a diseased, half-caste progeny condemned to grow up in an environment of drunkenness and degradation. The Aborigines were encouraged to settle in mission stations and government reserves, most of which, however, were no better than concentration camps. They were considered beyond salvation, and the best that could be done for them was "to smooth the dying pillow." In the meantime, they had to obey rules enforced by the missionary or manager, who all too often both pounded the Bible and tightened the leash. The Aborigines were told what to eat, what to wear. They received no pay for working on the stations, and even the money they earned by making native artifacts for tourists had to be handed in. Schools, however, were established, and a genuine effort was made to teach the children to read and write.

Today, despite the savage repression of the last century and a half, and contrary to expectations, the Aborigines are not dying out. The Aboriginal population of Australia is increasing twice as fast, proportionately, as the white population, and they now number about 140,000 of whom nearly half live in or on the outskirts of the cities and larger towns. The other half live in missions, settlements and on pastoral properties in northern and central Australia.

They have changed little from the Aborigines of old. They are a freedom-loving minority, bent on equality, resentful of any authority or even any form of organization, independent and yet depending on each other, with little interest in worldly possessions, and therefore with little initiative for a sustained work effort. High value is placed on family ties and human relationships, and they are extremely attached to the land where they were born, but in a spiritual rather than materialistic way. There is little crime among them. They get drunk—but even here the records are inflated by certain overzealous (and prejudiced) police officers.

Awakening militancy

No national leader has as yet emerged, although one or two of the older men and women have achieved some recognition. There are several militant groups led by young radicals, and contact has been made with "black power" movements in Africa, the United States, New Zealand, the Caribbean and Latin America. A mission accepted an invitation to Red China, and returned enthusiastic about its treatment.

In 1972, when the present Labor government was elected in Australia, it promised many reforms. Their implementation will depend greatly on the goodwill of the white population. Certain of the more coherent Aborigines advocate a return to their original culture and laws, at least where possible, but any changes in direction have to be carefully planned. There can be just as many heartbreaks for the Aborigines in returning to their "dreamtime" as there were in becoming "civilized."

Aboriginal family at a reserve near Darwin displays all the trappings of modern suburban civilization.

The new

Exxon is developing energy technology for this century and beyond.

Across our country Americans are coming to terms with the energy shortage. Faced with lines at service stations and limited supplies of heating oil, we have all become aware of the need for conservation.

Yet, even with conservation, by the year 2000 our country will probably require three times as much energy as it does today. Fossil fuels will continue to supply an important part of that energy. But a good deal of America's future supply in this century and beyond will have to come from new technology.

Exxon is already working on this technology to develop several new sources of energy.

Energy right from the sun.

One of those sources is the ultimate source of almost all of our energy—the sun itself.

The sun's energy is enormous and widely available. It can be collected and converted to electricity by *solar cells,* like those that produced electrical power for Skylab.

This five-cell solar module absorbs sun rays, producing 1½ watts of electricity.

Solar energy in use today.

Today, as Exxon examines ways to improve its solar-cell technology, solar-cell units are already in use. In parts of Africa solar cells power instructional television. On boats, they maintain the charge in batteries. On marker buoys they supply electricity for warning lights and foghorns.

One of Exxon's research aims is to cut the present high cost of solar-cell electricty.

Super-batteries to store energy.

To efficiently use the energy generated by solar cells and other devices, we'll need super-batteries with much greater storage capacity. Batteries to store the sun's energy for use as electricity at night. Batteries to store energy that power plants produce in low-demand periods for later use when the demand for electricity is high.

Better batteries would also speed the development of electric vehicles. Exxon's target is a battery that would be light enough, reasonable enough in cost and charging demands, and powerful enough to drive a car 100 miles on a single charge from a wall outlet. This kind of battery, which still requires intensive research, could make possible a practical electric passenger car.

Electricity from chemicals.

We're also developing a *fuel cell.* Different from the solar cell, which uses the sun, a fuel cell generates electricity when certain simple gases, like hydrogen and oxygen, or a simple liquid fuel like methanol, are fed continuously into the cell.

Potentially, fuel cells are efficient sources of electricity. They could provide silent energy for mobile homes or remote vacation homes. They also might be designed as total energy systems for shopping centers or as a way for public utilities to supply additional power during high-demand periods.

Solar cells, fuel cells and improved batteries should come into greater use during the 1980's. Meanwhile, Exxon is looking for energy sources for the next century. Nuclear fusion is one possibility.

Improved lead-acid batteries make electric-powered vans practical for urban delivery. The next step—practical battery-powered cars.

energy.

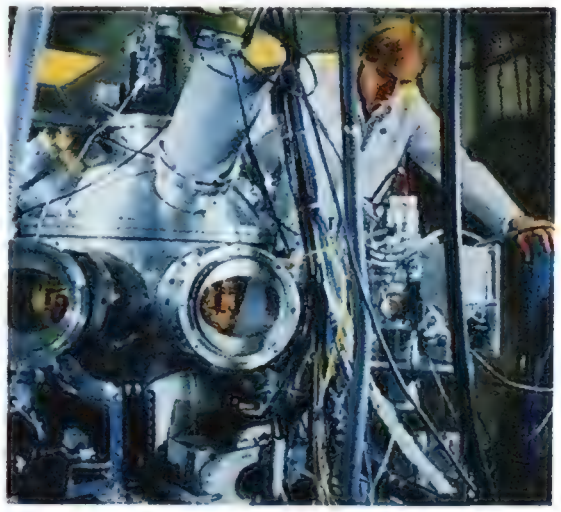
Developing ways to convert the sun's light and heat into usable, storable energy may make solar power a practical supplement to oil, natural gas and coal in this century.

Fusion reactors-a new kind of nuclear power.

Today's nuclear power plants operate on the familiar principle of nuclear fission, a process of splitting atoms apart. Nuclear *fusion* is just the opposite. Atoms are fused together to release a remarkable amount of energy.

Fusion is the main process feeding the fires of the sun and stars. Today, at the University of Rochester, Exxon and others are participating in a laser fusion feasibility project. It seeks to use the energy of high-powered lasers to heat frozen hydrogen pellets to sunlike temperatures of hundreds of millions of degrees in less than a hundred-billionth of a second—and thereby produce a fusion reaction.

Harnessing fusion energy is one of the greatest challenges scientists have ever undertaken. However, even if our efforts or those of others are successful, commercial use of fusion reactions to produce energy is many decades away.



At the University of Rochester, Exxon is participating in a nuclear fusion project. We are attempting to simulate the action of the sun by focusing powerful laser beams on a tiny piece of matter inside this metal chamber.

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EXXON

By Peter Chew

Great stallion's skeleton is stabled in museum attic

Lexington raced long before the Kentucky Derby was organized; in its century of running, his progeny have won a large slice of honors

"He was not a passing meteor that rushes through the air, dazzling our eyes with its brilliant light, leaving little or no impression, but a blazing sun whose influence interpenetrated and has become identified with all our stock. No horse was his equal upon the American turf, and none can compare with him as a stallion. . . ."

Thus eulogized the *Kentucky Live Stock Record* in the flamboyant style of 1875. Lexington, greatest sire of thoroughbred running horses America has ever produced, had died at the age of 25, less than two months after the running of the first Kentucky Derby. That race was won by one of Lexington's grandsons, Aristides. Now, as the 100th running of the Kentucky Derby takes place on May 4, it is interesting to note that Lexington's direct descendants won 16 of the first 33 Derbies and his blood flowed in many later winners.

Lexington's mounted skeleton is now Catalog No. 16020 in the fourth-floor attic of the Smithsonian's Museum of Natural History in Washington. The bones were once a star attraction. Today, more valuable for study than staring, the skeleton stands on an antler-strewn catwalk three floors above the "Life in the Sea" exhibit. It is wedged, incongruously, between those of a blackfish and an African okapi.

The famous stallion was born on St. Patrick's Day, 1850, on the farm of Dr. Elisha Warfield, a friend of Henry Clay and John Breckenridge. The site is now downtown Lexington. The foal's sire was Boston, a stallion so savage that someone had suggested he be "either castrated or shot—preferably the latter." He suffered neither fate, for he was what Kentuckians call "a *running* horse." He won 40 of 45 races, most of them the grueling four-mile heat contests of the day.

The little foal was a bay with four white stockings and a snip of white on his face. He was named Darley. At maturity he stood 15 hands, 3 inches, and his first race, in May 1853, stamped his greatness, for he beat a

Peter Chew's book, The Kentucky Derby: The First 100 Years, *is being published by Houghton Mifflin.*

Alas, poor Lexington! He stands on the fourth floor of the Smithsonian Museum of Natural History.

bunch of the best Bluegrass three-year-olds and wasn't breathing hard enough to blow out a match.

Richard Ten Broeck, a major stockholder in a New Orleans racetrack, was scouting for Kentucky horses and he managed to get Darley for $5,000 (with the help of several partners), agreeing that he would change the horse's name to Lexington and so let him represent Kentucky at what he hoped would become the nation's preeminent race. Ten Broeck, black sheep of a prominent Albany family, had "resigned" from West Point after a dispute—some said a duel—with one of his professors and had worked as a riverboat gambler on the Mississippi.

He campaigned Lexington at a time when match races were in vogue, and first accepted a challenge from the filly Sally Waters in a contest of three-mile heats. A few weeks before the race, Lexington broke from his stall into a corncrib and gorged himself to the point of collapse. Sally Waters went to the post a two-to-one favorite.

The race was a cakewalk. Lexington won both heats with ease, leaving the filly so exhausted and broken,

as some accounts have it, that she died not long after.

Though Ten Broeck had hoped for entries from nine or ten states for his big race on April 1, 1854, only three horses took the track against Lexington: Lecomte, representing Mississippi; Highlander from Alabama; and Arrow, from Louisiana. Twenty thousand persons jammed the course, leaving downtown New Orleans all but deserted.

Again Lexington romped, and after the race Ten Broeck bought out the Kentucky members of his syndicate. He ran Lexington the following Saturday for the horse's one and only defeat: Lecomte won the first heat, shaving six seconds off the world record; in the second heat, Lexington's jockey became flustered, started to pull up, and by the time he got going again it was too late. Ten Broeck was stunned. He immediately started issuing challenges but was rebuffed.

One year later, Lexington set a new world record for four miles, then finally met Lecomte again. Excitement knew no bounds. But, alas, the Lexington-Lecomte duel proved an anticlimax. Lecomte had suffered an attack of colic and was clearly not himself. Lexington won one heat, and then Lecomte withdrew.

Ten Broeck had hoped to take Lexington to England, but the colt was going blind—his career at an end after only seven races. He was sent to stud, back in Kentucky, then sold to Robert A. Alexander for a then staggering $15,000. The horse moved to Woodburn Farm, not far from the town for which he was named.

According to historian John Hervey, "Lexington begot more first-class racehorses, male and female, than any other stallion before or since." Most horsemen would agree that nothing has happened in the interim to change that assessment. Because farm records and horses alike often went astray during the Civil War—Lexington himself was shipped temporarily to Springfield, Illinois, in 1865—authorities differ concerning the exact number of the stallion's offspring. Kent Hollingsworth, editor of *The Blood-Horse,* numbers 533 colts and fillies, an amazing 238 of them winners.

In the days of the riverboat races, the winning captain displayed elkhorns on his pilothouse. Throughout the stud career of the blind hero of Woodburn, a magnificent pair adorned the door of his stall.

Painting by Edward Troye, courtesy of The National Museum of Racing, Saratoga Springs, N.Y.

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The master of suspense, Alfred Hitchcock, sat for his portrait in 1966. The hands were cast from life.

By Rosalind Constable

Mme. Tussaud's waxworks–are they really art?

Some of the newly fashioned likenesses in the famous London museum have eerie resemblance to New Realist sculpture

Most people think of Madame Tussaud's waxworks museum in London as a place to take the children for the visual instruction of the historical tableaux and the delicious thrills of the Chamber of Horrors. They forget to what extent Madame Tussaud's is a repository of history, and how often even the most grisly portraits have been taken from life—or death.

Madame Tussaud was born Marie Grosholtz in Switzerland in 1761. At the age of six she went with her mother to Paris to live with her childless uncle, Philippe Curtius, who later adopted his petite and pretty niece. Curtius had started out as a doctor in Bern and, in order to improve his knowledge of anatomy, had taken to modeling the limbs and organs of the human body in wax. From this practice he graduated to modeling miniature wax portraits, which attracted the favorable attention of the Prince de Conti (a cousin of Louis XV) during a visit to Bern. The prince urged Dr. Curtius to abandon medicine and come to Paris, promising him his patronage—a promise that was amply fulfilled. By 1770 Dr. Curtius had opened an exhibition of life-size wax portraits of

Color photographs by Derek Bayes

very important people that was an immediate success with Parisians.

At the age of 17 Marie Grosholtz, by now her uncle's skillful apprentice, had made what is her earliest surviving portrait: a study of Voltaire, done in 1778, when the aged philosopher was on a rare visit to Paris. (The excitement and the acclaim were too much for him, and he died there in May of that year.) Marie's portrait, the last made during his lifetime, is still in the museum.

Among the many visitors to Dr. Curtius' studio was Madame Elizabeth, sister of Louis XVI, who became infatuated both with the idea of modeling in colored wax (by then a popular pastime) and with Marie. She invited Marie to live with her at Versailles and give her instruction in modeling. Marie remained at the palace nine years. On the eve of the revolution her uncle thought it prudent to recall his niece to the comparative safety of his home. Dr. Curtius considered himself a friend of the people, and Marie now found herself dining with the likes of Robespierre and Marat (not to mention Benjamin Franklin).

Although Marie was imprisoned on suspicion of being a Royalist, which she was, her life was spared—probably because she was useful. An hour after Robespierre himself was guillotined by the friends of the people, she was summoned to make a death mask—still in the museum—of the severed head. When Marat was murdered in his bath, her services were once again called upon. In her *Memoirs* (ghost-written) she was later to recall: "They came for me to go to Marat's house at once, and to take with me what appliances I needed to make an impression of his features. The cadaverous aspect of the fiend made me feel desperately ill, but they stood over me and forced me to perform the task." It was on her version of Marat's death (p. 80) that Jacques-Louis David based his famous painting, *Death of Marat.*

During her many years in residence at Versailles, Marie had made several tableaux of the Royal Family. In 1790 she innocently depicted them dining sumptuously, and three years later the angry, hungry mob threw the effigies into the Seine. Not long after, they brought her the head of Louis XVI for a death mask. She stoically complied (she had no choice), but when they brought her the mangled head of the Princess de Lamballe, the Queen's favorite, she fainted. Nine months after the decapitation of Louis XVI, they brought her the disheveled head of Marie Antoinette. These gruesome heads are still on display, alongside the actual knife that severed them. Years after heads had ceased to roll, Madame Tussaud's son went back to France and for a considerable sum bought from the executioner the knife and lunette from the original guillotine, together with a standby chopper, in case the great knife should fail.

By 1800, Marie, now married to one François Tussaud, was modeling her hero, Napoleon, with Josephine supervising the sittings, for which Madame Tussaud had been summoned to the Tuileries at six in the morning. Two years later, having inherited the museum from her deceased uncle, Madame Tussaud left her dim husband and went to England, with 70 exhibits and her eldest son. For the next 30 years she toured the British Isles, then settled in London's Baker Street. (The waxworks are now in Marylebone Road, having survived shipwreck, fire, riots and bombs. The original molds are miraculously intact.)

Madame Tussaud's first royal sitter in England was George III. The Duke of Wellington soon became her new hero, and inadvertently provided the museum with a historic scene: The Duke, a frequent visitor, was spotted one day by Madame Tussaud's son gazing raptly at the tableau depicting Napoleon on his deathbed at St. Helena. The son was so struck by the drama of the confrontation that he mentioned it to his friend, the artist Sir George Hayter. Hayter promptly transferred the scene to canvas; it was bought by Madame Tussaud, and engravings of the painting became best sellers.

For more than 200 years now, Dr. Curtius, Madame Tussaud (who died in 1850) and their descendants,

Madame Tussaud supposedly made this self-portrait in 1842, when she would have been about 81.

Mrs. Constable is a free-lance writer in New Mexico who avidly follows modern art. She writes frequently for Book World *and* Architecture PLUS.

including her great-great-grandsons (trained sculptors and Royal Academicians) have made wax portraits of the famous and the infamous. (Death masks are made when unavoidable, otherwise they are modeled from life because life masks have the appearance of death masks.) The infamous are tactfully placed in what was originally called the Separate Room, long since dubbed by *Punch* the Chamber of Horrors. In *The Romance of Madame Tussaud's,* written by her great-grandson John Theodore Tussaud, he recalls an 1873 visit of the then Shah of Persia, Nasir ad-Din, to the Chamber of Horrors. The Shah was particularly smitten with the guillotine, and suggested that a condemned man be sent for so that he could see it in operation. A quick-thinking employee informed the Shah that there did not happen to be at the moment a prisoner eligible for decapitation. The Shah then called for a volunteer from his entourage, but none came forward. (No two authorities agree on what is fact and what is fiction in the history of Madame Tussaud's. Undoubtedly, some of the legends should be taken with a grain of salt.)

But anecdotes nearer our own time are more credible. The "acid bath murderer," John George Haigh, knowing he was destined for the Chamber of Horrors, packed up his clothes the night before his execution in 1949 and had them delivered to Madame Tussaud's. Acting as messenger boy, Prime Minister Attlee returned from Washington bringing with him one of President Truman's suits, for his effigy at the museum. Accuracy of detail has always been part of the museum's policy. It was none other than the daughter of Japanese Prime Minister Yoshida who arranged his robes in their intricate ritual folds (even as, in 1894, Isabel Burton had lovingly dressed the effigy of her late husband, Sir Richard Burton, in the robes and dagger he wore on his famous pilgrimage to Mecca).

Managing Director Edward V. Gatacre and sculptor Jean Fraser discuss unfinished figure of Charles V.

Madame Tussaud took a cast of Marat's head immediately after he was stabbed in his bath in 1793.

Wax head of English sculptor Henry Moore receives some cosmetic finishing touches from Jean Fraser.

But museum authorities were mortified when Lord Montgomery, inspecting himself, noted with disapproval the absence of one medal ribbon on his battle dress. Paradoxically, those in search of "the real thing" sometimes don't find it at Madame Tussaud's: The Garter robes displayed at Winston Churchill's old home, Chartwell, were actually made for Madame Tussaud's, and used to clothe one of the 13 Churchill effigies at the museum.

No art critic, however, has ever taken Madame Tussaud's famed tableaux and wax portraits seriously as art. Until recently, that is. In December 1972, a few months before his death, an effigy of Picasso was placed in the Grand Hall. Picasso was portrayed casually straddling a chair and could have been mistaken for a simple visitor surveying the scene (p. 84). But the face was so superbly modeled that it attracted the attention of the eminent art critic Robert Melville, who devoted an article in the *New Statesman* to the "new look" at Madame Tussaud's, and to the young sculptors responsible for it. Picasso, wrote Melville, was the work of the museum's chief sculptor, Jean Fraser, whose portraits "achieve a quiet and unassuming intensity not to be found in the earlier exhibits." Miss Fraser worked from photographs. Wrote Melville: "Roland Penrose tried to arrange a sitting for her and showed him [Picasso] photographs of the Rembrandt she made for the Amsterdam Tussaud's, but he said that since Rembrandt didn't pose for her he saw no reason why he should." Nor did Picasso supply his own clothes: The sculptor dreamed up an outfit she thought best suggested the artist. Melville also praised the museum's *Agatha Christie* (p. 82), which, he observed, "has a disconcerting reality right down to the thickened ankles."

The Sleeping Beauty *breathes*

Madame Tussaud's portraits sometimes move their heads (British reformer William Cobbett) and *The Sleeping Beauty* breathes, but not until recently had anything at the museum made a sound. In 1966, however, it presented an ambitious new tableau, *The Battle of Trafalgar . . . as it happened,* a deafeningly loud, smoke-laden reenactment of that famous victory. Roy Strong, the young and super-critical former director of London's National Portrait Gallery, was so carried away by the scene depicting the death of Nelson that he likened it to "a bizarre updated Lamentation over the dead Christ" (p. 83). In the *Spectator,* he wrote: "This is the grand historical group which is the quintessence of the Tussaud tradition, but here superbly done." Another critic declared that with this piece Madame Tussaud's had created "a new art form." But what else is *The Battle of Trafalgar . . . as it happened*

Agatha Christie, doyenne of whodunits, is one of the most praised of the museum's newer figures. The author sat for her portrait and contributed the dress for an added touch of authenticity.

but a mixed-media happening? What else is *Agatha Christie* but a New Realist sculpture?

Back in the Twenties, when art critic Roger Fry wanted to say something disparaging about Roman sculpture, he referred to its highly polished "Mme. Tussaud surface." The museum's sculptors throughout its history have always followed fashion; the high polish derived from the smooth marble portraits of the 18th and 19th centuries. Madame Tussaud's head of Louis XVI, for example, could have been the work of Houdon, had he worked in wax. Indeed, according to great-grandson John Theodore Tussaud, Houdon was not only a school friend of Dr. Curtius but also assisted him in his work.

"Our purpose is entertainment"

Some five years ago the high polish disappeared from Madame Tussaud's contemporary portraits when Jean Fraser (who has been with the museum some 20 years) began to work in a rough-textured surface fashionable with 20th-century sculptors. It is this rough texture that has brought a new reality to Madame Tussaud's sculpture, and makes it comparable to New Realist sculpture, so much so that one asks: If New Realist polyester resin portraits are art, why aren't Madame Tussaud's wax portraits art?

Oddly enough, the first people to deny that Madame Tussaud's wax portraits are art are the sculptors themselves. Said Jean Fraser in a recent interview: "I don't think we are trying to do the same thing as the New Realists, because I feel that most of those people are making some kind of social comment. Nor, except on very rare occasions, are we setting out to fool the public." Said one of her assistants: "Photorealism is something we've never tried to achieve. In fact, we try to avoid it."

Madame Tussaud's managing director, Edward V. Gatacre, has this to say: "It's an accident that people are deceived by what we do. Our concern is making life-size portraits in three dimensions. Our purpose is entertainment. It's as simple as that. Period." When it was suggested to Gatacre that the museum's life-size portrait of Malcolm Muggeridge, for example, bore a remarkable resemblance to the work of the New Realist sculptors, he vehemently denied it. "It's impressionistic," he insisted. "It's a condensation of the artist's view of Muggeridge. If you take a life cast, it's a snapshot of a moment, and usually a very crude one. If you model, there's a concentration of time, and into it is also brought what the sculptor knows of the past of the person, and subconsciously of his future. The sculptor doesn't do exactly what he sees." This statement would seem to be a rather neat definition of the creative process.

In this multimedia tableau, *The Battle of Trafalgar*, Lord Nelson, dying, receives news of his victory.

Duane Hanson's New Realist sculpture, *Dishwasher* —is it more artistic than a Mme. Tussaud waxwork?

Today Madame Tussaud uses polyester resin rather than plaster for the invisible body work because it is lighter: The much-manhandled exhibits—about two million visitors a year—have to be removed, and their faces repainted and their hair (real) washed and set every three months. Had the museum people thought it advisable to switch from wax to polyester resin for the faces themselves, they would have done so. As it is, the museum sculptors consider that wax, painted in water color, is a far more truthful medium. In fact, they claim to despise the less than lifelike hues of the New Realist figures.

Actually, close up, the rough-textured waxworks are less realistic than the polyester resin sculptures. But from a respectful distance they are more realistic, and for this reason, perhaps, more artful than the work of the New Realists. "I don't say it's not art," Gatacre rather grudgingly and ambiguously conceded, "but we'd never say it is art. It's entertainment."

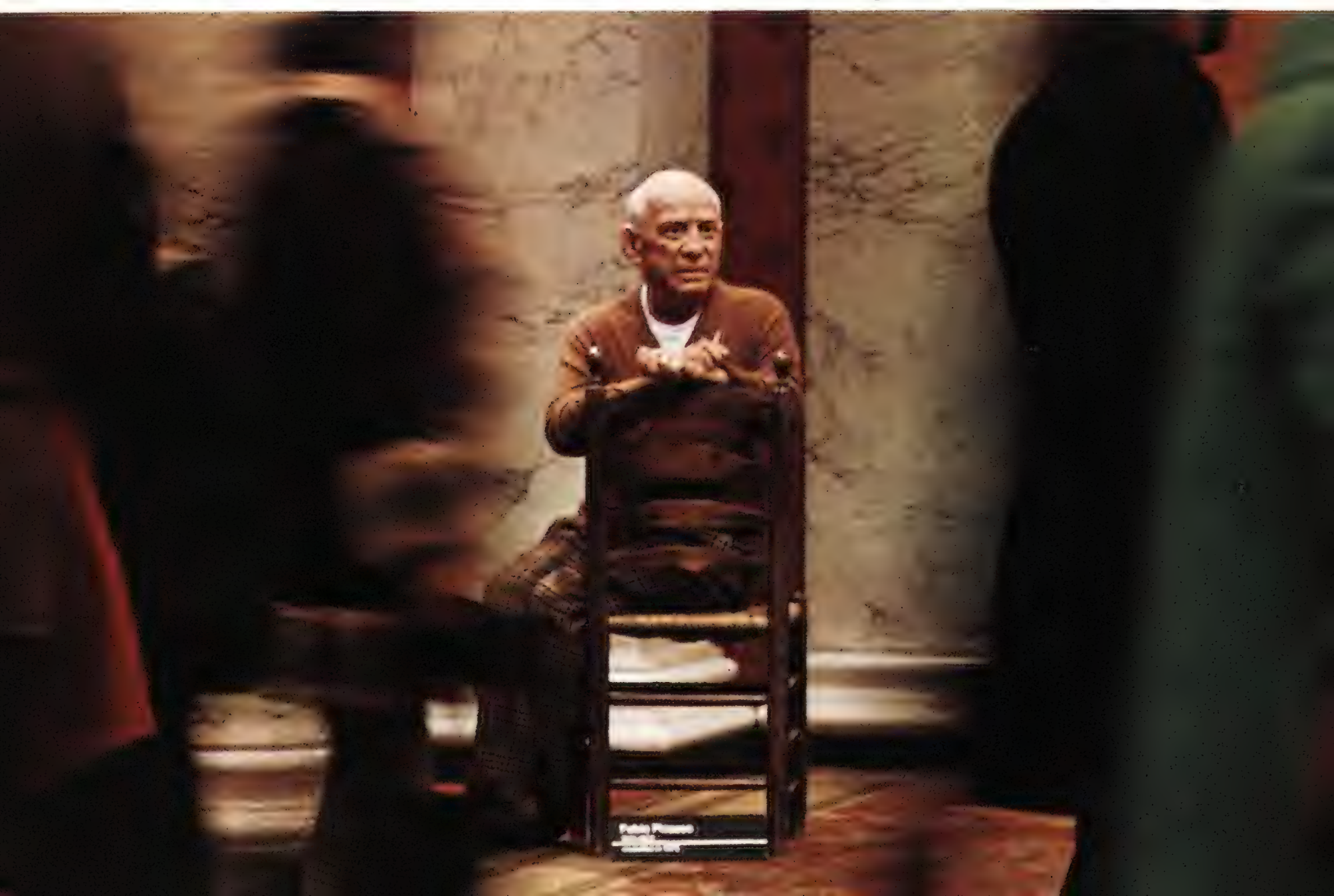
But most examples of New Realist sculpture are, by and large, entertaining.

Last February, when O.K. Harris Works of Art put on an exhibition in New York of New Realist sculpture by Duane Hanson, visitors to the gallery were confronted by the artist's tired *Dishwasher,* lolling on a wire crate (p. 83). After they had made quite sure he was not real, they giggled—as do visitors to Madame Tussaud's when they discover that the policeman on duty at the entrance is wax. (They laugh even harder when the motionless, uniformed guard they are about to poke suddenly comes to life.)

It is possible that Madame Tussaud's portraits, which some critics recently discovered are "superbly done," have been art all along. Only nobody realized it, because they were done in wax rather than in the more conventional, and therefore acceptable, marble or terra-cotta. But today, when anything goes in the way of materials, it is possible to look at these wax portraits with a fresh and unprejudiced eye.

If New Realist polyester resin portraits are art, as many critics concede they are, then, in the opinion of this writer, so are Madame Tussaud's. But if the new work at Madame Tussaud's is not New Realism, as the museum's personnel insist, then perhaps waxworks are eligible for consideration as a viable art form in a category all their own. We hereby nominate Madame Tussaud's waxworks museum as a new outpost of the art world.

A wax effigy of Picasso sits in the Grand Hall, oblivious to throngs of museum visitors.



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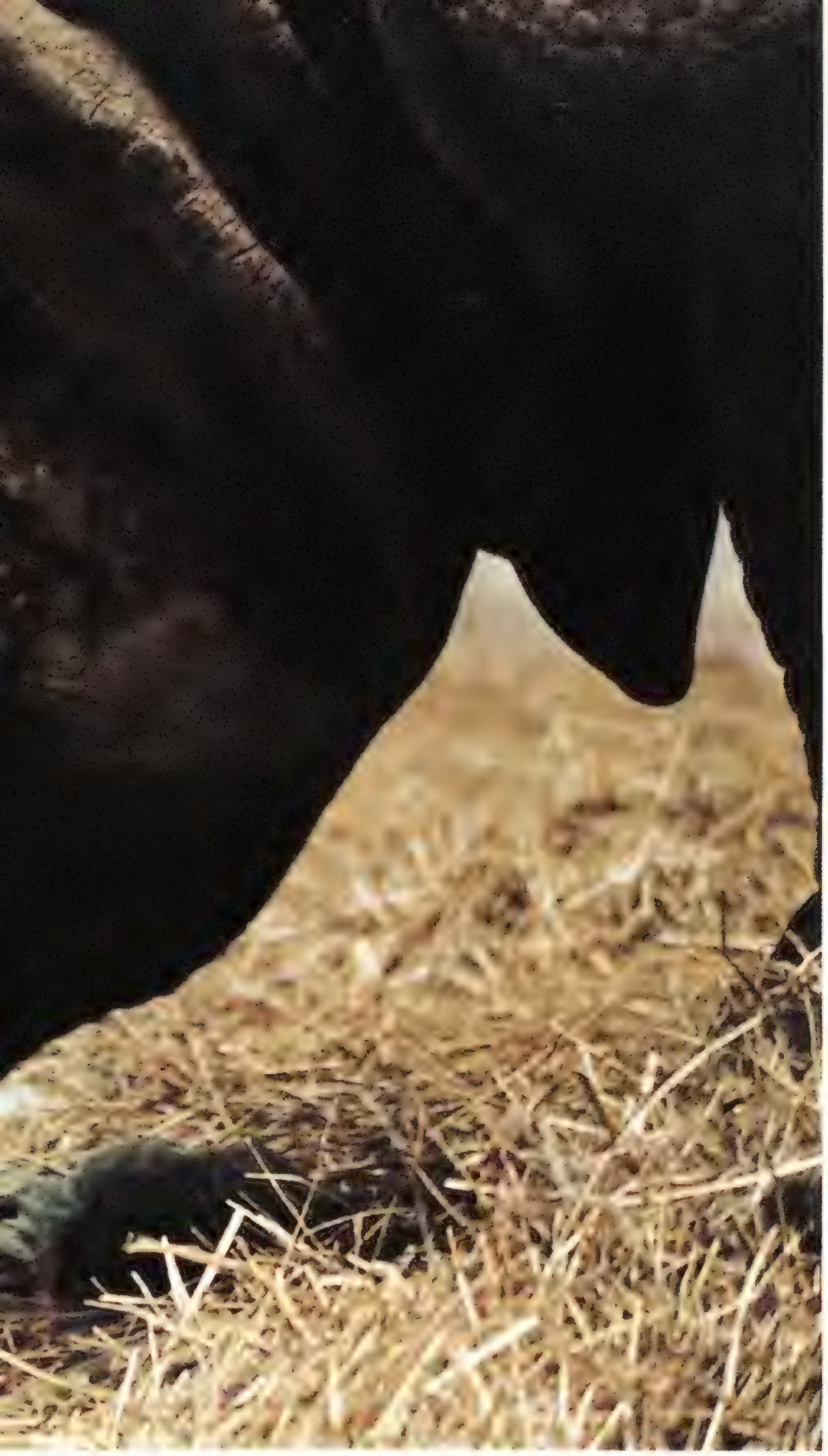
Photographs by Yoichi Okamoto

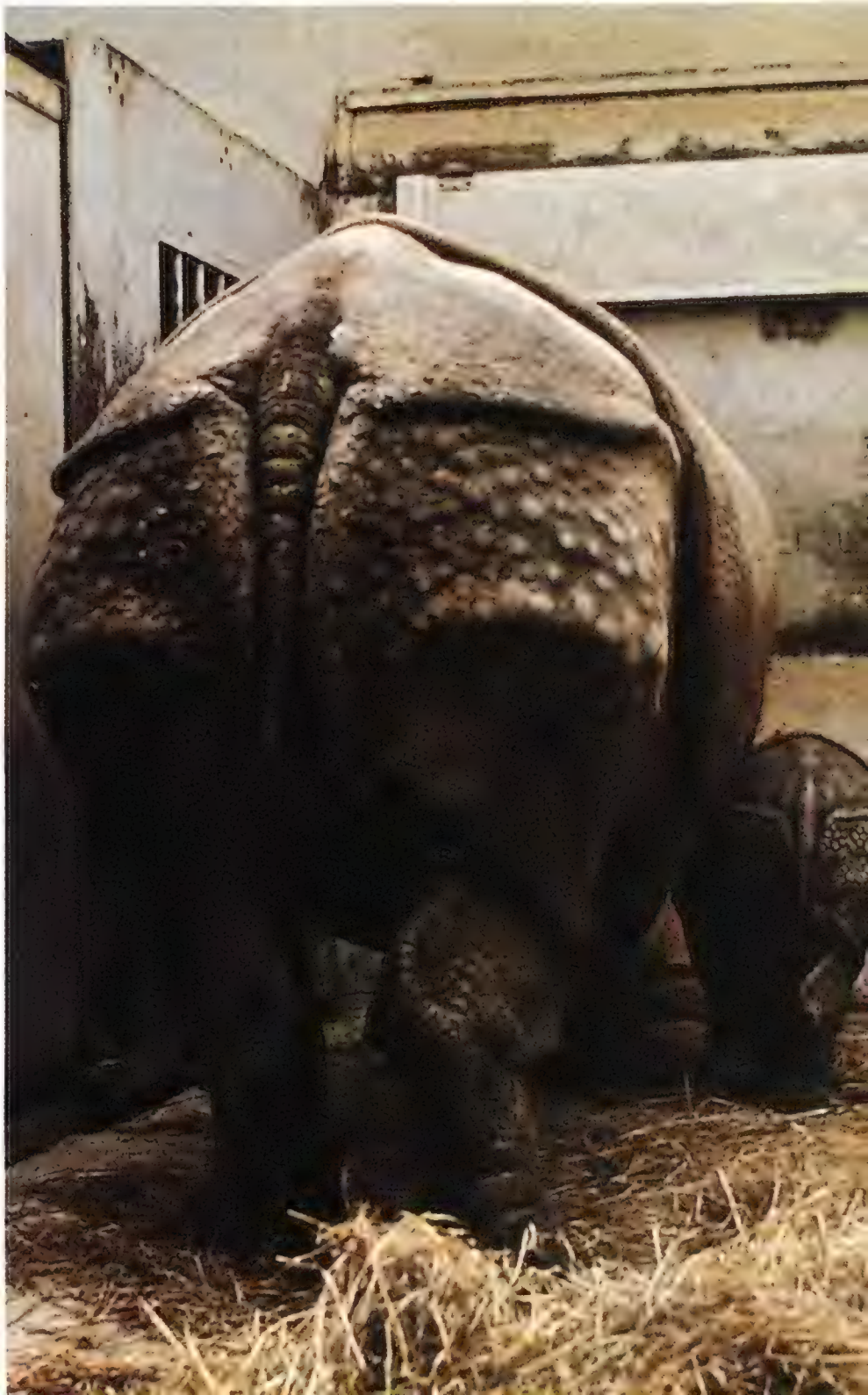
Nose to nose with baby rhino

It took only 16 months of pregnancy, but this hemisphere's first newborn Indian rhinoceros now cavorts in the National Zoo

Patrick is the first Indian rhinoceros born live in the Western Hemisphere and almost certainly the first one anywhere to be named for an Irishman (technically an Irish-American, Daniel Patrick Moynihan, the U.S. ambassador to India).

The mother is more traditionally named—Rajikumari, which means little princess; she weighs only about two-and-a-half tons. Raji had her firstborn a little later than some rhino mothers—she was 11 in April—and her courtship with Tarun, five years her senior, was nothing if not dramatic. It began back in the spring of 1972—daily visits filled with whistling, scenting and other rhino rituals, including a light-footed dance by Tarun and a great deal of initial confusion. Eventually, under the direction of the Na-





tional Zoo's Dr. Helmut Buechner, volunteers stood all-night vigils, extending the rhinos' parietal right to 24 hours. September 30, 1972, Patrick was conceived.

Four hundred and eighty-seven days later, on January 30, 1974, Patrick was born, weighing 125 pounds. Within a month he weighed 261, a gain of 136 pounds on nothing more than mother's milk, which probably will be his sole sustenance until mid-1975, when he will weigh nearly a ton.

For now, amid the chirpings of the squirrel monkeys that run free in the National Zoo's Elephant House, Patrick plays vigorously with his mother and sleeps a lot. And since he is one of only 700-odd Indian rhinos in the world, he and his parents are a significant reason to hope that an endangered species will survive.

By Mary H. Cadwalader

Early warnings of future disaster

A 28-year study suggests that our emotional makeup may reveal our susceptibility to cancer, coronaries, mental ills and suicide

Unconscious and morbid fears

In 1952 two young men, each well-educated and well-to-do, entered the Johns Hopkins School of Medicine with the brightest of prospects. Both were sons of prominent medical men, had been brought up in cultivated surroundings, had attended Ivy League universities, were handsome and well-liked, and were expected by their instructors to "do excellent work" and to "make outstanding physicians." But in actuality their futures were forlorn. Both died before the age of 40, one of suicide, the other of cancer.

Could these tragedies have been foreseen? Were there clues in the physical or emotional makeups of these young men that could have been spotted and recognized as early-warning signals of disaster?

And do such clues, as yet tenuously glimpsed and little understood, exist in a number of us, hinting of premature illness or death before our time?

A unique study—thought to be the longest continuous analysis of its type in the country—suggests that clues do exist, and moreover that they are as often embedded in one's personality and habits of daily life as in one's bodily frame. Under Dr. Caroline Bedell Thomas, Professor Emeritus of Medicine at Johns Hopkins University, certain details in the profile of an individual are being found to foreshadow the likelihood of disease or death overtaking him or her prematurely. The Precursors of Essential Hypertension and Coronary Artery Disease (to give the study its full name) has been in progress for 28 years and is now beginning to bear fruit. It is finding precursors not only to the diseases named in its title but to cancer and suicide as well. While there have been similar studies, many were retrospective; that is, they selected groups of the already afflicted and searched backward for predictors and causes. Dr. Thomas' study is *pro*spective in that she began with healthy men and women in their early twenties and is following them through their lives. Other prospective studies have usually started with middle-aged populations.

"We all know racehorses don't pull plows and plowhorses don't win races, but perhaps we don't realize how people are also limited by their physiques or their personalities, and that when these limits are ignored severe illness may result. My goal is to identify the danger signals, the earliest indicators of disease," says Dr. Thomas, who received a Mastership from the American College of Physicians last year.

Starting her study in 1946, Dr. Thomas recognized that a pool of valuable test material was arriving each year at Johns Hopkins as medical students. First, they were young and healthy; second, they were readily available and could be thoroughly tested during their

can undermine biological guardians.

When limits are ignored, illness may result.

medical-school years. They could be interviewed in depth. But, most importantly, as future physicians themselves they could appreciate the value of cooperating in the lifelong follow-up program. Seventeen successive classes were tested between 1947 and 1964. In addition to physiological examinations which included electrocardiograms and cholesterol levels, students underwent tests of their reactions to cold, to exercise, to smoking and to a salt-free diet. The presence of disease and causes of death in parents, grandparents, uncles and aunts were recorded.

Psychological probings went deeper still. Standard Rorschach and figure-drawing tests were given to bring out characteristics such as aggression, passivity, anxiety, hostility and depressive trends. Questionnaires covered early childhood, schooling, family life, outside interests, emotional outlook and personal aims and objectives. There were 11 pages of questions concerning habits of life: smoking, drinking (coffee and tea as well as alcohol), diet, medication, hobbies and pastimes, even laxative-taking and sleepwalking. One test developed by Dr. Thomas which was to prove revealing involved Habits of Nervous Tension, called HNT. Subjects were asked 25 questions on their responses to stress. Some of the most important signs of nervous tension were difficulty in sleeping, frequent urination, irritability, loss of appetite and either an urge to be left alone or to confide in others and seek advice.

The picture of each young man or woman that emerged was so vivid that today staff assistants who have not met any of the subjects feel they know them "like old friends." Changes appear as the annual follow-up questionnaires are dutifully returned. As time goes on, some quit smoking, some get divorced, get promoted, or concede they are tired and overworked. Dr. Thomas and her staff are compiling exhaustive data on a total of 1,337 students, of whom only six have been "lost," that is, have vanished and failed to reply to the follow-ups.

Now, as the earlier subjects ripen into mature medical men, usually prominent in their communities, life (and death) is beginning to catch up with them. Testimony to the excellent health of the majority is that only 41 have died. Thirty-six, however, have reported some type of malignant tumor, 12 have suffered heart attacks and more than 100 have blood-pressure levels signaling early hypertension. As the study population moves into middle age, the study itself is hitting its

Sculptures and photographs by Charles Mendez

What's inside our head can affect our heart.

most productive years and already has some positive statements to make.

The most important is that susceptibility to premature disease and death may, in fact, be predicted in the full bloom of youth. Dr. Thomas hastens to emphasize the word *susceptibility*. By no means is it possible to assert that suicide, cancer, coronary heart disease, stroke or mental illness—the afflictions under the statistician's microscope—will overtake a specific person. In the great majority of mankind, obviously, there seem to be counterbalancing factors which safeguard the internal equilibrium. Nevertheless, adding up the many little indicators which, over the years, have revealed themselves as red flags, Dr. Thomas feels the *potential* for suicide or for certain types of illness can definitely be shown.

Dr. A., for example, of the pair mentioned at the start of this article, embodied many of the traits the suicides in the Hopkins study had in common. He was underweight and ectomorphic (slender in body form), his father was older than average (44) when he was born and, during his childhood, he had felt a sort of chilly aloofness within his family. He was a heavy coffee drinker, but consumed little alcohol. He had scored significantly on the Habits of Nervous Tension test, indicating that, even as a young man, he was sensitive to stress. (A retrospective study of University of Pennsylvania and Harvard students also linked nervous tension in youth with suicide in later life.)

Dr. A. had mentioned occasional depressed moods, and these developed, later, into two extended periods of gloom, the first requiring hospitalization and the second ending fatally with his taking an overdose of barbiturates when he was 35.

Dr. B., on the other hand, was different. He fitted what Dr. Thomas sees as the slowly emerging picture of the cancer victim—often a "low-gear" person, with low blood pressure and low cholesterol levels, who is self-contained under stress. Like the suicide, however, the precancer individual appeared less close to his parents than "unaffected" individuals in the study. Dr. B. said his family was undemonstrative. And he gave largely negative responses to the HNT questionnaire, apparently seldom prey to bursts of anger, anxiety or exhilaration. Or was, at least, unaware of such moods. These findings fit with those of other studies suggesting that cancer victims tend to repress their emotions and have feelings of isolation dating to childhood.

Dr. B. had a sudden seizure one day, was found to have an inoperable malignant tumor and succumbed within six months, just before his fortieth birthday.

Susceptibility to hypertension and coronary heart disease can also be assayed, Dr. Thomas thinks, and in this area her findings corroborate other research on older groups. For instance, the well-known Framingham heart study, begun in 1949 in Massachusetts under the sponsorship of the U.S. Public Health Service, found that in a large group of middle-aged people, high cholesterol levels, high blood pressure, and cigarette smoking marked those who were bordering on or already had coronary heart disease. What the Johns Hopkins study indicates is the presence of these same precoronary characteristics when individuals were still in their early twenties. Dr. Thomas has also shown that hypertension develops far more frequently in the offspring of hypertensive parents than in others. She now finds that hypertension, too, manifests itself long before it becomes an overt menace.

The aspect of the study that most fascinates Dr. Thomas at present, however, is the link between personality and subsequent illness, and because the roster of deaths to date records suicide as the major cause—16 of the 41 deaths have been self-inflicted—this group has come under the closest scrutiny.

Taking the Rorschach test answers, in which subjects state what the famous series of inkblots resemble,

Once a newspaperwoman and a Life *editor, free-lance writer Mary Cadwalader now raises beef cattle on her farm in Maryland.*

Dr. Thomas and her staff found a list of key words that were used by suicides, while nonsuicides employed them rarely. The list included words like: alcoholic, bleeding, fractured, ulcerated, dwarfed, toothless, cancerous, drowning, and so on—words of pathological or morbid content. More than 42,000 Rorschach responses were sorted and computerized by the staff.

Among the suicides, key words denoting cancer appeared *14 times* as often as in the answers of the rest. "Two women with carcinoma of the breast," was how a suicide described one of the inkblots, where nonsuicides more often saw something like "two fat women lugging a ragged pillow." "Drowning" is another sinister key word. Five years before he killed himself, one student said an inkblot looked like "a man with hands upraised, crying for help, drowning." Among the nonsuicides, only four used that word, two of whom have since suffered emotional disturbances.

Warnings of other diseases

Equally intriguing, such words appeared a good deal more often in the Rorschachs of those who were later to develop coronaries, hypertension, malignancies and mental illness than in those of the "unaffected" population—those who so far remain healthy. Where the unaffected group tended to see clouds, insects or "a piece of fried chicken" in the inkblots, a typically morbid response (from a student who later developed cancer) was: "an embryonic monster with a tail, large feet, decaying stumps for arms."

"The meaning of these findings concerning pathological content is still highly speculative," wrote Dr. Thomas in a paper published last June. "Are such responses . . . a reflection of unconscious dreads and morbid fears which, in some individuals, are ever-present stresses undermining the biological guardians of general resistance?" If dark thoughts are furtively gnawing at the health of presumably normal youngsters, in short, will such answers, given in a routine testing situation, serve as predictors of premature illness?

It is too soon to say with certainty, but results from the ongoing Precursors Study indicate the warnings are there, and long before life has worked its hardships and strains upon us. Pondering ways to enlarge such knowledge, Dr. Thomas reflects that "if all hundred-or-so medical schools in the country applied a strictly uniform series of tests like these to the roughly one hundred students admitted to each school each year, we'd be testing 10,000 people annually, and I think the patterns would emerge quickly and convincingly."

Sensitivity to stress can foreshadow disaster.

The NCFA's Explore Gallery features a kind of superior jungle gym, draped with knitted snake that echoes the Gene Davis stripe painting. There's a light show in crawl space under ramp.

By Peggy Thomson

Please *do* touch these exhibits

Antique toy carousel is down near the floor, hard on parental knees but just right for kids.

Two Smithsonian museums have opened rooms, primarily for children, where objects can be handled as well as just looked at

It's only as visitors play in them, responding to what they see and touch and hear, that the two new rooms become what they were intended to be: the Explore Gallery for children in the Smithsonian's National Collection of Fine Arts and the Discovery Room in the Museum of Natural History.

The mixed-media creature stationed outside the Explore Gallery door is instantly identified by children as a frog, although they rattle off for their docent its unfroglike features: It is seven feet tall, not green, and has hair. Having thus considered what is art, what is reality, the children squeeze through a round hole at the bottom of the door and enter a room of bright colors, strong repeated shapes, varied textures, movement in light and sound—a room where everything that's reachable may be touched.

There's a ramp to travel with a colorful patchwork of carpet squares; twined in the rafters overhead is a 20-foot snake, its stripy knit skin making visual jokes with the Gene Davis stripe painting on the wall (opposite). There's a portrait gallery of urchins, masks, madonnas and chairmen of the board, with a distorting mirror, nicely framed, in the lineup. And a doll-size carousel with several postage-stamp portraits, one of them Teddy Roosevelt's, hidden under the roof peak (top right).

Free to roam, the children investigate the crawl space under the ramp with its private light show and snake's-eye view of the stone mosaic sculpture garden. They press hands and noses to a globe—an astralite by

Astralite is an illuminated globe in which mysterious shapes float around in slow motion.

Adam Peiperl (above)—where luminous shapes float to the surface in a mesmerizing way.

The room's creator, Margery Gordon, did not in fact expect quite such an athletic response from her school-age visitors as she has got, but she feels the children who race up the ramp, bat the chimes and grimace into the mirror in three seconds flat have loved the room in their fashion. "It offers many levels of response," she tells the NCFA guards, who are inclined to be skeptical, preferring the old no-nonsense rule: Don't touch.

One nine-year-old to another, overheard in the Explore Gallery at the close of a full morning's art tour: "Whew! I needed that!"

Photographs by Charles Phillips

Explore and discover

At the Natural History Museum's Discovery Room, which is open during a limited period each day, it's off-duty guards, out-of-town visitors and retired couples who are turning up along with the children, eager to handle, heft, tap, hold to the light.

The walls in this high-ceilinged, sunny room are unadorned. There are no graphics to distract, and few labels—spare ones, at that. But here saltwater fish tanks, there a shoulder-high bed of grasses—wheat, oats, barley—a bog terrarium, a high-hanging plankton net, and everywhere free-standing stacks of open bins filled with specimens. White-lab-coated staff members are told not to instruct. They're assigned to trade coats at the door for necklace-type magnifying glasses, to serve specimen boxes from the shelves and to connect people with objects that lead to discovery.

Elephant tusk is smooth, curved, hard and hollow—you can run your arm inside it.

Some children strike out, direct, for the freeze-dried crocodile head which, king of the castle, leers open-jawed from the top level of the carpeted platform (opposite). They pat its knobby skin, sit on its snout, offer fingers and arms to its bite, pronounce its teeth real and its eyeballs fake. "They're marbles!"

Others cruise the room. In passing, they run a hand over the cannonball concretion, glide it over the propeller curve of the whale vertebra, pick up the human vertebrae small enough to fit into young hands.

Some make random tries at the "stumpers": How account among the large rocks for grooves, wrinkles, holes, sharp edges, smooth sides? Is it tite, is it mite? (Answer: stalactite.) Are these teeth? (Yes for the duckbill dinosaur jaw; no for the look-alike rock.) That piece of modern art is a salt lick nicely shaped by a bovine sculptor named Diana (with a photograph documenting the Holstein tongue at work).

A child reaching inside the elephant tusk says she feels the space curving and tapering (left). A boy finds it odd: The woolly mammoth's tooth has ridges slick as marble; the mineral asbestos is woolly to the touch. Another boy says the finned coral looks but does not feel "mushroomy" (opposite, top).

A skull like "Gardenia's"

Those who wish may ask for boxes which they carry to tables or to the carpeted stairs—the boxes are fitted like a jeweler's case with a single specimen per compartment and a pack of sturdy picture cards on a ring. Through the afternoon shifting clusters of parents and children are handing things around, matching cards, reading to each other.

Preserved squid inside Plexiglas cylinders are a favorite (got by asking for mollusks or cephalopods). Youngsters apply magnifier to eye to get a shudder-inducing look. With three minutes' reading of the picture cards, they boast of distinguishing squid from cuttlefish from octopus.

Teeth are favored by gap-toothed youngsters, kneeling side by side and trying out fangs and grinders for size. They trade back and forth the fragile skulls of small animals: "Hey, that's what Gardenia looks like inside—see #3, CAT!"

The mineral box has the most things to do—split mica down its cleavage, scratch a fingernail across the talc, compare a block of halite with a crystal of table salt. The boxes of shells are the prettiest. The disk of floating plankton is the most mysterious of the objects in the room and comes with a filmstrip to show the

Peggy Thomson wrote about the Tusing sisters of West Virginia in the March 1973 SMITHSONIAN.

various organisms in movement—jet-propelled, paddling, parachuting.

Film viewings are private on small table-top screens —and silent. There's no swelling organ, no lecturing pedagogue, no babbling cartoon to spoil the Discovery Room sounds of companionable chat, the clack of shells or of knuckles rapped on a sea turtle's back.

That's the way it's supposed to be, according to young Discovery Room director Judy White—who says, though, that she made two miscalculations: 1) that she'd require a well-stocked spare parts cupboard, which in fact has barely been used; 2) that people would stay a quarter of an hour, when a lot of them clearly want to spend the day. One who did was a young and very thoughtful boy who settled into a long period of reflection before the 10-foot whale jawbone and its 14-inch counterpart, from a cow, mounted on a wall side by side. He was willing to leave only when he could announce to his father which jawbone he had established to his satisfaction must be which.

Although it looks like an inside-out mushroom, it's a finned coral and the edges are sharp.

A real crocodile with real teeth, but it's safe to test his bite because he's freeze-dried.

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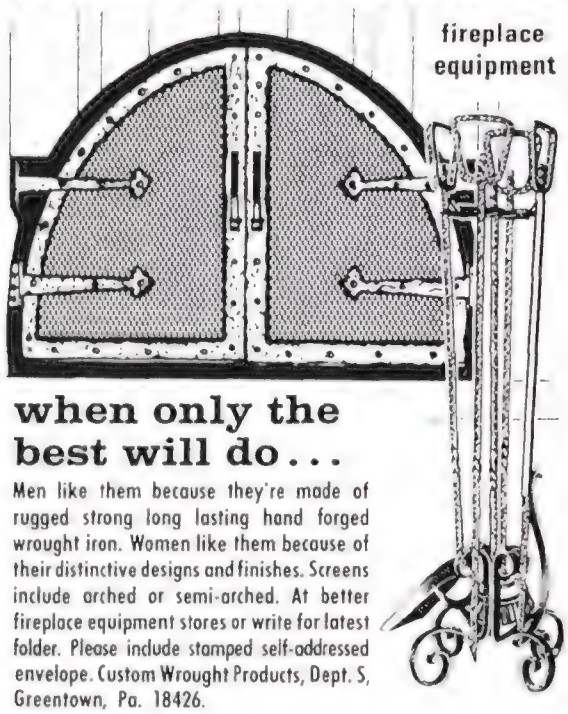

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Book reviews

Battle for the Wilderness
Michael Frome
(Praeger, $7.95)

We are a strangely perverse species, we who call ourselves Homo sapiens. Given a wilderness, we say, "Develop it! Plow, cut, dig! Harvest it! Use it up!" But when we have made it into a city, a complex of factories and a maze of suburbs, we say, "Conserve! Save these last few acres of wilderness as a reminder of freedom!"

That is what Michael Frome is writing about in this book. He is prowilderness, and the book is published in cooperation with the Wilderness Society. There is no doubt where he stands. In his summing-up he says, "It is time to reintroduce wilderness into civilization. . . . In the restoration of a habitable environment for all people, I venture, is where the battle for wilderness begins."

Frome has divided his book into two major parts, "Wilderness Values" and "Saving the Wilderness," plus an epilogue. As a final note, he reprints the text (and an interpretation) of the Wilderness Act as enacted by Congress. It all adds up to the best summary of the situation I have come across, despite some heavy going here and there, which in large part is a result of packing so much material into a limited space.

The first half of the book deals with the history of conservation in this country and should be fascinating. It begins with Captain John Smith, comes down through the Colonial period to the fabulous Bartrams, to Alexander Wilson, to Audubon, to Thoreau, to John Muir, Theodore Roosevelt, Gifford Pinchot and, from there, right down to today. The facts are there, but somehow the bright thread of drama is missing.

The second section, "Saving the Wilderness," has the benefit of legal action, which creates its own drama. And of course there is the conflict between the users and the savers, the exploiters and the conservationists. Even within the conservationist movement there are the Muirs and the Pinchots, who at times seem unable to agree on anything except the time of day.

Throughout the book, moreover, one is aware of the shadow and often the substance of the energy crisis, almost as a reminder that it was not ended by its official demotion to a mere "problem." Frome says: "There is tragedy in the grayed skies and clouded rivers that characterize modern America, but the greater tragedy is that such blight is so widely taken for granted—as though nothing serious has been lost so long as the environment can still yield material sustenance. . . . Too many people are degrading their way of life by competing for too little of what we all need."

And here, too, is one of the best statements I have seen about the effect of off-road and all-terrain vehicles when used for recreation. Turn a snowmobile, or any of those off-road vehicles, loose in a wilderness area, and there goes your wilderness. Frome's solution is to restrict them all to established roads "and save the back country while there's still some worth saving."

It is unfair, perhaps, to end this review on a minor note, but that is where most people encounter the wilderness issue, on the minor battlefronts. That is why it is so difficult to write a book about it—the big problems get lost in a maze of lesser ones. To get the most out of this book, I would suggest that the reader turn first to the epilogue and read it, then start at the beginning. The story is all there, even though it takes a bit of digging at times.
—Hal Borland
Novelist, naturalist and essayist, now living in rural New England

The Legend of Baby Doe
John Burke
(Putnam, $7.95)

The story of Baby Doe has already passed into folk myth, a Hollywood movie and

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even grand opera. Burke's factual account of her life demonstrates that she was a genuine legend. The facts don't seem to diminish her story.

Baby Doe met Horace Tabor in Leadville, Colorado, the silver-mining capital of the West, in 1880. She was young, gorgeous and determined to be rich. He was some 20 years older, and stupid. By sheer accident he had recently wound up owning the richest silver mine in Leadville. It was almost an inevitable

Baby Doe wore ermine to the opera

marriage. He was already married, but the divorce scandal only guaranteed them full public attention when they set up housekeeping in the grand style in booming Denver.

For a decade the fates fawned on Baby Doe and Horace. They spilled their fortune with an exuberance almost too innocent to be vulgar. The author, who has written biographies of Buffalo Bill (SMITHSONIAN, April 1973), Diamond Jim Brady and Amelia Earhart, is wonderful at describing this sort of childish opulence. Hordes of live peacocks strutted on the lawn of their mansion. She wore furs and jewelry by the bushel; so did he.

They invested in everything from Mexican gold mines and Central American mahogany forests to the supposed crown jewels of Queen Isabella. The more they were swindled, the more they

made. Denver society ostracized them, of course, but Horace and Baby Doe lived in their own paradise.

Suddenly, during the panic of 1893, Horace went broke. When he died a few years later, he owned nothing but a by then worthless mine known as the Matchless. Horace was a lousy businessman; his last advice to Baby Doe was never to give up the mine.

She never did. Though still beautiful, she turned down all offers and marched off to the Matchless. She spent the rest of her life, 36 long years, hanging on to a barren strip of hillside above Leadville. She refused anything she considered charity, and held off creditors with promises or a shotgun. Undaunted, she tried to revive the Matchless and raise two daughters; one disowned her, the other died an unspeakably squalid death. Baby Doe changed from a pampered beauty to a tattered half-mad recluse. But she never gave up the Matchless. Shortly before she died in 1935, she still insisted that fortune was almost within her grasp once more.

Her story resists explanation; she was somehow larger than life. Burke, who describes the wealth and the violence of the heyday of silver-mining superbly, appears to find Baby Doe herself unfathomable. Everyone who knew her did. In her old age she was something of a tourist attraction, and sometimes put down her shotgun to receive visitors, signing autographs and reminiscing for them. Then, in the winter, when blizzards sealed off her cabin, she sat alone and wrote in her diary: "Alone, alone. Visions of gold everywhere. . . . No food left. On my hands and knees. Need bread. Cold."

—*Madeleine Lundberg*

Author of SMITHSONIAN articles on LSD (January 1971), hypnosis (March 1972)

Sir Walter Ralegh
Robert Lacey
(Atheneum, $10.95)

In Tudor England there were many self-made men, and some of these were self-invented, commodities for royal or popular consumption. Walter Ralegh was both. He came from nothing distinguished, son of a minor Devonshire squire so little a gentleman that he had to rent his acres instead of own them. The boy went away to war in his mid-teens, fight-

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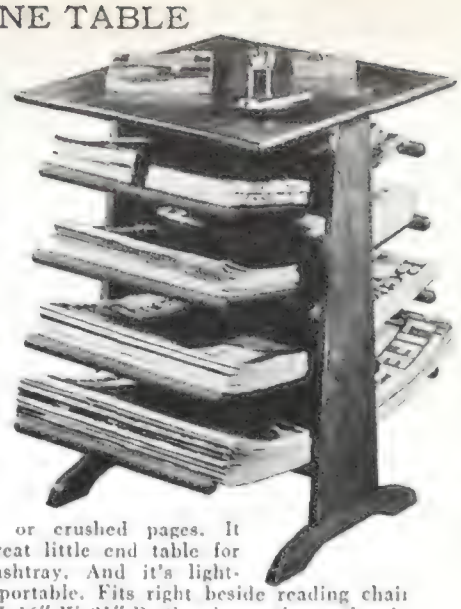

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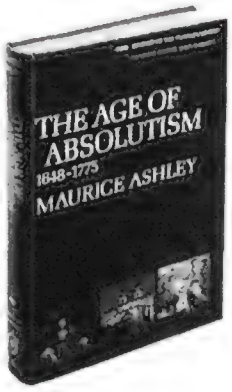

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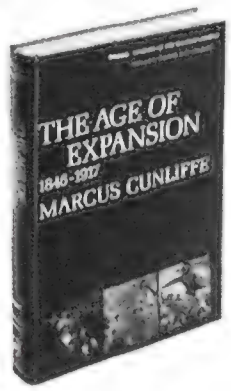

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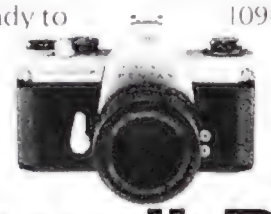

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ing in France for a Huguenot cause that too often matched atrocities with its Catholic opposition. This education was followed by a few years at Oxford that have disappeared in anecdotes of pranks and brawls, but none of scholarship.

No doubt more pertinent to Ralegh's learning and ambition was his association with his half-brother, Sir Humphrey Gilbert, a gentleman adventurer whose gift for command was marred by an uncertain temper and a taste for extreme solutions: He slaughtered the Irish he was sent to govern.

When we see Ralegh at 25, about to vie with the pack for Queen Elizabeth's attention, he is already the romantic egoist essentialized: handsome, foppish, arrogant, passionate, and passionately willful. To be sure, Ralegh had rich gifts of language and intelligence, but his talents merely served his style. His poems to the queen, like his felicities of speech, were strategies aimed at winning favor. His martial attitudes were tactics in the unending battle for preferment. Even when fighting for his head against King James, who was determined to have it, his last resort was rhetoric. Losing his head, he had the last word.

Ralegh, it would seem, seldom acted impartially. His career is stitched with ulterior design like a cheap doublet embroidered in gold thread. The effect is gorgeous, but the garment is wanting in substance. He salvaged little from his grand schemes: He did not find the golden city of El Dorado; the Virginia colony was lost; the Azores expedition failed; the Sherborne estate was snatched from his wife and son and bestowed by the infatuated king on Robert Carr. All that remained was the sense of a life lived fuller than life.

But the underlying truth was failure. There was the appalling cost of his errors of pride and his heedlessness. Where was calculation then? The role of audacious hero seemed to overwhelm the player. Ralegh lost his friends; he provoked powerful enemies through insult and condescension that any seasoned politician might have avoided.

More important for Ralegh's fortunes, the Tudor reign gave way to the Stuart. The crypto-Catholic faction Ralegh had offended came to power. Spanish policy, combated by Ralegh as Elizabeth's agent, prevailed with her successor, James I. There was no redress for a life lived in

the wrong style for all the wrong causes.

Ralegh's colorful, tragic story is told by Robert Lacey with admirable narrative flair. But the book goes beyond mere popular biography to accommodate, skillfully and painlessly, important recent Ralegh research. Special attention is paid to the chronology of Ralegh's own writings and to his recently discovered love affair with an Irish girl, Alice Goold, by whom he had a daughter. Mr. Lacey gives a particularly sympathetic and persuasive account of Ralegh in adversity: The hero seems to grow in decline. The book is entirely absorbing.

Readers especially interested in the social and intellectual forces that contributed to the formation of Ralegh's personality would do well to consult also Stephen J. Greenblatt's *Sir Walter Ralegh: The Renaissance Man and His Roles* (Yale University Press, 1973). Professor Greenblatt sees the public man as a work of art. But general readers will prefer Lacey's fuller and livelier account.
—*Gene Baro*
Critic and lecturer on American culture

Legends of the Earth
Dorothy B. Vitaliano
(Indiana University Press, $12.50)

Volcanic eruptions, floods and earthquakes—the often catastrophic whims of nature—have found their way into folk memories since human communication first took place between the generations. In addition, prominent landforms, especially those in some way unusual, have figured in folklore; no doubt there is scarcely a distinctive mountain or geological oddity in the world that has not been explained by the actions of gods or giants. Thus we have inherited an enormous subject matter, ranging from the mythology of primitive tribes and ancient nations to the relatively recent exploits of such folk heroes as Paul Bunyan.

In *Legends of the Earth*, Mrs. Vitaliano combines geology and folklore in a study she calls geomythology, and takes a well-researched look at the lore surrounding geological phenomena across the world and through the ages. She regales the reader with dozens of diverse and sometimes delightful legends relating to earthquakes and volcanoes, to floods, glaciers, rocks and minerals, and a wide variety of erosional and depositional features of the

Travel the Smithsonian way

You are part of the Smithsonian when you travel with other Associates on a Foreign or Domestic Study Tour. Whether your interest is geology, anthropology, natural history, folklore, archaeology, art, music, drama or architecture, there is a tour for you. You will be accompanied by Smithsonian curators or other experts and, where possible, taken behind the scenes of Smithsonian exhibits and research projects.

FOREIGN STUDY TOURS

Ethiopia and Kenya—May 24-June 14: Ancient and contemporary cultures from Aksum to Lalibela, plus several days in Kenya.

Black Sea Cruise—September 18-October 6: Depart and return Athens, via Turkey, Bulgaria, Romania and Russia.

Afghanistan and Pakistan—October 20-November 16: Archaeological and historic sites.

DOMESTIC STUDY TOURS

Santa Fe and Taos, New Mexico—June 19-27: A comprehensive look at the Indian, Spanish and Anglo-Saxon cultures which comprise the heritage of the Southwest. From the missions and pueblos to the museums in Albuquerque, participate in a program of discussions, films, lectures and field trips.

Boston Art and Architecture—June 21-24: A brunch with curators at the Museum of Fine Arts; walking tours of Beacon Hill and Harvard University; a side trip to surrounding country mansions, with emphasis on interior decoration, furnishings and architecture.

Colorado River Float—July 7-12: A raft trip down the Colorado River through Canyonlands National Park, Utah; camping, hiking and an opportunity to study the unique geological features of the area.

Berkshire Music Festival—July 13-20: Evening concerts at Tanglewood, Jacob's Pillow Dance Theater, Storrowtown Music Tent Theater and the Berkshire Theater; daytime trips to Old Sturbridge Village and the Mohawk Trail

North Carolina Craft School—August 18-24: A week at John C. Campbell Folk School attending various classes and meeting with local artisans.

Iceland and Faeroe Islands—August 17-31: Two weeks of exploration by air and sea from Reykjavik to Westman Islands, Latraberg and Akureyri, including a stop at the ancient site of the Althing; visit Faeroe Islands and cross the Arctic Circle (depart and return New York).

For information on specific foreign tours, write Miss Bliss Schumann, Foreign Tours, Room SI 123; for information on specific domestic tours, write Mrs. Rosa Mae Howe, Domestic Tours, Room SI 106, both at Smithsonian Institution, Washington, D.C. 20560.

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earth. While the presentation unfolds, we are given a sound basic course in geology as well.

The similarities to be found in some of the myths are notable, and there is little doubt in many cases that legends have gone a-wandering with the traders and missionaries of the past. Thus, geographically and culturally distinct peoples have adopted and modified the tales told them to fit into their own surroundings and life patterns. This has probably taken place on a broader scale than one would at first suspect, and seems a reasonable, if partial, explanation for the universal nature of such lore as that of the Deluge.

Beyond the Deluge, which has a chapter to itself, the lore in this book ranges from the bear who left his claw marks on Devil's Tower in Wyoming to the plagues of Egypt and the fascinating weaving together of legends about the catastrophic volcanic eruption that blew the Aegean island of Thera to pieces, the disappearance of Minoan civilization on Crete, and the lost Atlantis.

This last discussion is certainly the high point of the book, spanning two meaty chapters and reflecting on-the-spot research and years of careful study by the geologist-author. It would take one far better versed than this reviewer in matters of classical antiquity to judge her theories about lost Atlantis, but she certainly presents a battery of seemingly reasonable facts to support her admittedly tentative conclusions. In any case, this book is fun to read and provides much on which to speculate.

We need more books like this to break down the walls between scientific and nonscientific disciplines, for to be aware of the fanciful as well as the factual is to add a new dimension of enjoyment to any natural phenomenon.

—Barbara Blau Chamberlain
Author of *These Fragile Outposts*

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A workable B.C.-type plan for the U.S. is lucidly described in Peter Fisher's book **PRESCRIPTION FOR NATIONAL HEALTH INSURANCE** (North River Press, $6) and in his new brief to Congress, **A Rational Proposal for a System of National Health Insurance** ($1). Let's pay our money to doctors and hospitals for health care, not to middlemen for paperwork & profit. Send for book and/or brief today.

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Smithsonian highlights

Renwick Gallery of Art
"The Goldsmith" is an exhibition of original handcrafted work selected from a recent competition among artists working in metal. Included is the jewelry, hollow ware, flatware and architectural and decorative accessories of 145 contemporary artists. After three months at the Renwick, the show will travel to the Minnesota Museum in St. Paul in early September—opens May 17.

National Collection of Fine Arts
The theme of this spring's "Children's Day" is fantasy. The event includes strolling musicians, artists' demonstrations, magicians and activities planned mainly for children age 4-12—Saturday, May 18, 10 A.M. to 4 P.M.

National Air and Space Museum, Arts and Industries Building
"The Douglas World Cruiser" is a continuing exhibition celebrating the 50th anniversary of the first round-the-world flight. Of the four aircraft that began the flight in 1924, only two completed the six-month mission. One of those, the *Chicago,* has been newly restored and is featured in the exhibition along with photographs and a pilot's diary of the record-breaking flight.

"Exhibition Flight" demonstrates barnstorming, air racing and aerobatics with the Waco 9, Pitts Special, Turner Special and Bücker Jungmeister on display. Continuous films of air shows are featured in the grandstand theater, and a simulated barnstorming flight and wing-walking stunt are also included in the recently opened major exhibit.

Divisions of Performing Arts and Musical Instruments
The Theater Chamber Players and the Gregg Smith Singers present a concert featuring selections from Beethoven, Schönberg and Luigi Dallapiccola—May 6, 8:30 P.M., Baird Auditorium, Museum of Natural History.

In conjunction with the Kennedy Center Mozart Festival, Washington area musicians present two all-Mozart concerts of rarely heard chamber works—May 12-13, 8:30 P.M., Hall of Musical Instruments, Museum of History and Technology.

The Jazz Heritage Series presents The Jim Hall Duo on guitar and The Jimmy Giuffre 3 on flute, clarinet and saxophone —May 19, 4:30 P.M. workshop and 8 P.M. concert, Baird Auditorium, Museum of Natural History.

For information, call (202) 381-5395.

Museum of History and Technology
A new tour open to the public, "A Touch of Glass and Ceramics," highlights the special attractions in the museum's collection of historical and contemporary earthenware, pottery and glass objects. Tours begin at 10:15 Tuesdays and Fridays at the entrance to the Ceramics Hall.

Museum of Natural History
"A Discovery Room" is a continuing "touch and feel" exhibit designed to intensify the museum experience. It consists of shells, fossils, woods, teeth and other specimens available to the visitor for examination (see p. 92).

Spring Museum Hours
The Arts and Industries, Air and Space, History and Technology, and Natural History buildings are open daily from 10 A.M. to 9 P.M. All other museum buildings close at 5:30 P.M.

Report for Associates
The latest volume of a new quarterly publication, the "Smithsonian Institution Research Reports," discusses studies ranging from the spectacular bird migrations in Central and South America to archaeological studies in Brazil. For a free copy, write Associates' Reception Center, Smithsonian Institution, Washington, D.C. 20560.

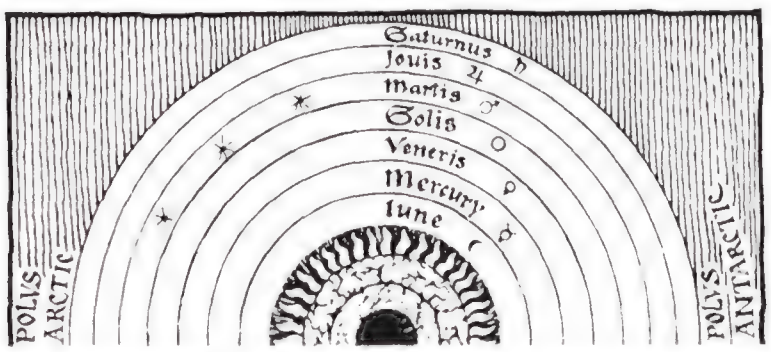
Conversation Pieces

Technically intriguing items from TRW, guaranteed to add luster to your conversation and amaze your friends.

How the Days Got Their Names — On Thursday, March 2, 1972 our Pioneer 10 spacecraft left for Jupiter, the first of the outermost planets. Although Pioneer travels so fast it swept past the Moon's orbit in a mere 11 hours, the voyage to distant Jupiter (a half a billion miles away) took two years.

Pioneer 10's departure took place on a peculiarly appropriate day. Thursday, it happens, is named after Jupiter. In fact, if we look back through astronomical history, we find that every day of the week is associated with an object in our solar system.

Early astronomers named the planets after gods and goddesses, and believed that each planet "ruled" or had primary influence on one day of the week. Jupiter, they held, ruled Thursday and so named the day Jove's day, or *jeudi* in the French*. Our Anglo-Saxon forebears replaced the Roman Jove with their equivalent deity, Thor. Hence we know it as Thor's day or Thursday.



THE NAMES OF THE DAYS COME FROM THE PTOLEMAIC SYSTEM

Here, for your information, is the complete planetary week. Women's lib advocates will be pleased to note that we should thank a goddess it's Friday.

Day	*Ruling Planet/ Divinity*	*Anglo-Saxon Equivalent*
Monday	Moon	—
Tuesday	Mars	Tiw
Wednesday	Mercury	Woden
Thursday	Jupiter	Thor
Friday	Venus	Freya
Saturday	Saturn	—
Sunday	Sun	—

*Those of you familiar with the French will see the planet's names clearly in *lundi, mardi, mercredi, jeudi, vendredi, and samedi.*

Burn Coal (But Not Throats)! Must a high standard of living and low quality of life always go hand-in-hand? The argument for the case is as follows. A high standard of living requires the consumption of large amounts of energy (e.g., lights, air conditioners, cars, home appliances). In producing and using this energy, however, we pollute our environment. If the air you breathe is toxic or the water you drink causes you to retch, be happy; your discomfort is proof positive you have a high standard of living.

To add to this dilemma, our so-called clean sources of energy are dwindling fast. A logical replacement is coal, the Earth's most abundant fossil fuel. Yet coal is a major polluter. When burned, it produces sulfur dioxide, a gas noxious to lungs, eyes, and throats. In 1970, for example, the U.S. pumped around 28 million tons of sulfur dioxide into the air.

How can we burn the coal and make the electricity and light the lights and run the air conditioners without befouling our atmosphere? At TRW, our answer is to remove the sulfur from the coal *before* burning it. The result: clean coal and a clean environment.

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The Smithsonian Associates' Museum Reference Service is available to members traveling within the United States. Associates may write for a packet comprised of lists, by state, of many of our country's museums, galleries and historical sites. Brochures are included when available. Please specify the states in which you will be traveling. Allow at least three weeks for mailing. Write Smithsonian Associates' Reception Center, Smithsonian Institution, Washington, D.C. 20560.

Puppet Theater,
Arts and Industries Building
"What If?" is a puppet space fantasy scheduled to open in May. For opening date, ticket information and performance times of the new original play, call (202) 381-5395.

Parking on the Mall
Metro construction has made parking on the Mall near the Smithsonian complex extremely difficult. All parking prior to 10 A.M. is restricted. The use of public transportation is recommended. Write the Associates' Reception Center, Smithsonian Institution, Washington, D.C. 20560 for current information.

Associates' Events
The Smithsonian Resident Associates is sponsoring a boomerang contest on the Mall, Constitution Avenue and 20th, N.W., Saturday, May 18 at 3 P.M. The spring event is open to the public.

Fossil digs at Calvert Cliffs, Maryland, are planned for Sundays, May 5, 19 and 26. Smithsonian specialists accompany Associates and their families on the archaeological expeditions.

For information on these and other Associates' events, call (202) 381-5157.

Smithsonian Commons
Located in the original Smithsonian "castle" building, the Commons offers a buffet luncheon and salad bar from 11:30 A.M. to 2 P.M. ranging from $1.60 to $2.25. Also available are coffee and pastries from 10 to 11 A.M. Presentation of an Associates' card is required. Members may experience a delay in seating as the Washington tourist season approaches.

Traveling Exhibition Service
There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write: Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- Rochester, Minnesota—"Eighth Dulin National Print & Drawing Competition" (Rochester State Junior College, May 4-June 2).
- Hayward, California—"Molas from the San Blas Islands (I)" (Chabot College Library, May 11-June 9).
- Evanston, Illinois—"The Nag Hammadi Codices" (Garrett Theological Seminary, May 11-June 9).
- Detroit, Michigan—"Our Only World (II)" (Children's Museum of Detroit, May 18-June 16).
- Charleston, South Carolina—"Meteorological Optics" (Archives Museum, May 25-June 23).
- Warren, Michigan—"Witness to Our Time" (General Motors Technical Center, May 11-June 9).
- Abilene, Texas — "The Magnificent West: American Heritage" (Abilene Fine Arts Center, May 4-June 2).
- Newark, Delaware—"Man in Sport (II)" (University of Delaware, May 11-June 9).

Contributing Memberships
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- Assistance in communicating with any part of the Smithsonian.
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- Research service for questions about subjects related to the Smithsonian.
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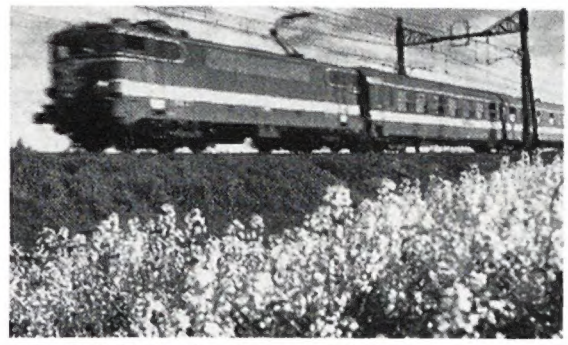

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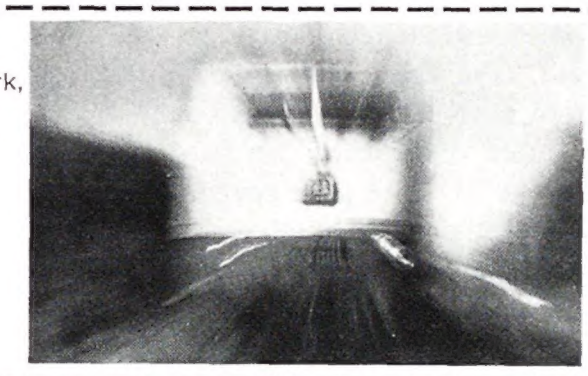

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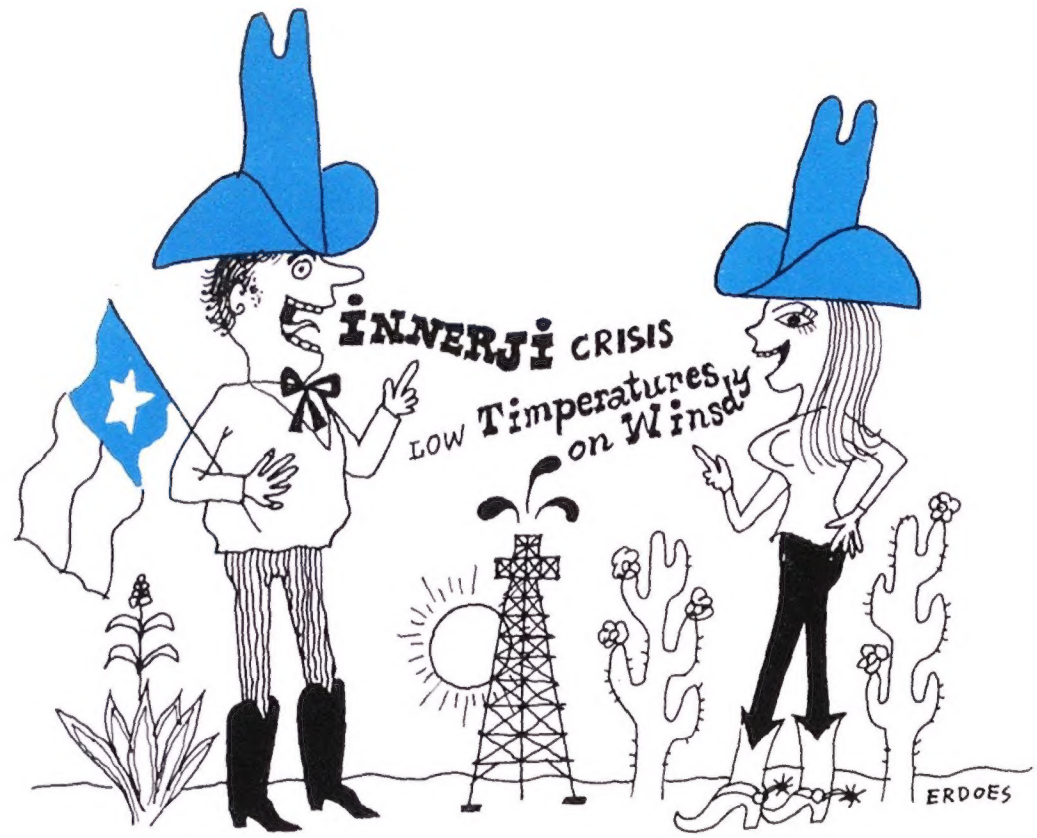


When it comes to foreign languages, I am a very impressionable party. I tend to pick up the speech habits and inflections of any person or persons with whom I am thrown together for an extended period of time.

My wife studied Spanish in college long years ago and lately has been taking refresher courses in high *español*. I have never taken a lesson in any foreign tongue, yet I frequently outscore her simply with words and phrases and sentences I've picked up from association with Mexicans and Mexican-Americans, and from reading countless books about the republics below the Rio Grande.

I have been exposed for several years now to a foreign language which I choose to call West Texian (though it is common throughout the great breadth of the Lone Star State), and I am fast taking on its tone and coloration. I have an Ozarkian family background, and I spent a few of my early years in the South, and my daughter married up with plantation folks, so a certain plasticity of the epiglottis, and steady exposure to black-eyed peas and grits, makes me susceptible to the kind of sounds I hear from day to day among the unharnessed peoples way out in West Texas.

Back East they don't cotton to it. Nonetheless I'm stubborning up about it. I don't care what the Eastern Slurvians think of my new speech habits. The language out where I make my home is, admittedly, not melodious. There is little euphony in it, but it has character and it is a foreign tongue and therefore worth considering and worth studying.

Just yesterday I found myself speaking to a neighbor about "the innerjy crunch." The "en" sound in all words gets a good wrenching-around out where I live. Much of the West Texas talk on which I base my scholarly research comes to me via television and radio, where the newscasters and the chitchat vendors strive earnestly to speak in the highly refined style of their environment. But let us, for openers, give further consideration to that simple syllable "en." Men and women alike, in the local broadcast media, deal with that syllable the way they judge the Lord meant it to be dealt with. They pronounce it "in."

I have just spent a good part of a day snooping on the airwaves in order to acquire a handful of further examples of what I'm talking about. Newscasts and talk shows, mainly.

Just an hour ago a lady demonstrating some sewing techniques on television said, "You want to bring the himline right even with the knee." And a gentleman spouter, considering the oil crisis, spoke of "the free interprise system."

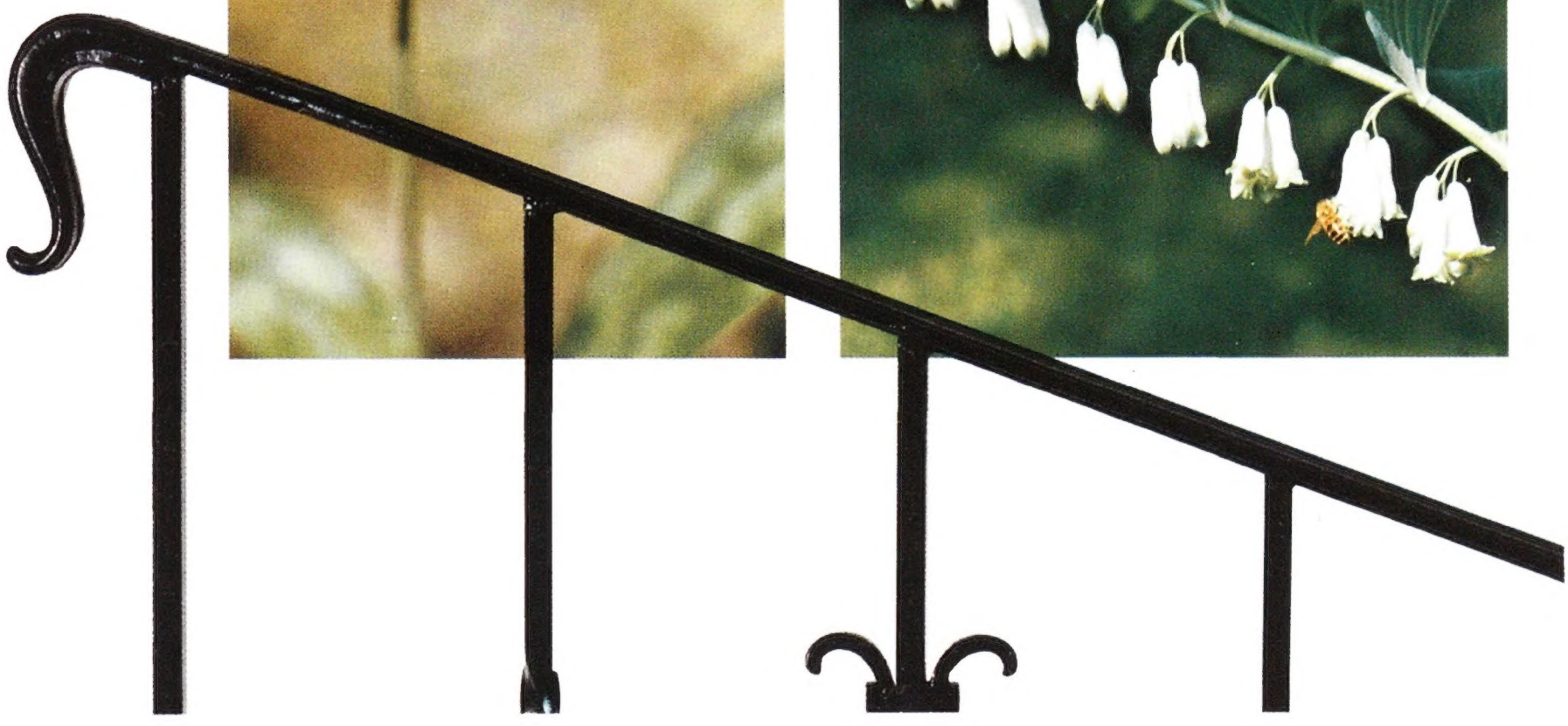
I kept notes throughout this morning and a part of this afternoon. My ear was tuned to pick up words in which the sound "en" became "in."

The way it works is, ten becomes tin. Twenty is twinny. I actually heard a newscaster give the time last night as tin-twinny. Two ladies of the town are saluted for their long and abiding frinship. In the weather report (given to us by an attractive girl) we are told to expect lower timperatures. On Winsdy, that is. William LeRoy Coker has been sintenced to twinny years in prison. Funeral arrangements for Mrs. Ida Klout are pinding. Kohler's Meat Market has some nice bargains in stewing hins. And so it goes, as Mr. Kurt Vonnegut says.

I'm well aware of the fact that I am beginning to talk West Texian. I know I was talking it last month when I went back to my old stamping grounds in Manhattan. People looked at me askance, which is a difficult feat in itself. I didn't have much time for innertainment in Gotham because I had some important business (bidness) to transact with a man named Hinderson—bidness respecting a new inding for my cowboy novel.

I talked West Texian to Mr. Hinderson as well as to all my frinds in New York, and I had a definite feeling that people were growing a little discouraged about my new vocabulary.

That suspicion was predicated on the fact that two of them offered to show me the way to either Kinnidy Airport or Pinnsylvania Station. So I came home.



You can take pictures or you can *make* pictures

Whether or not you're traveling less these days,* you probably know better than some that in a backyard, in a nearby park, just off a familiar path, there is plenty to see and appreciate. Somehow a camera in front of your eye forces you to take the trouble to see the beauty just right.

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*At Spokane, Washington this summer, we are at Expo '74 to preach the doctrine "Know the land and the people" with few words and such imagery as above. Public transportation is available from far and near. It's a World's Fair with pavilions from other nations, entertainment, and celebration of the natural environment.

ILLUSTRATION: VINCENT ZENONE, 1966; ADAPTED FROM "LA FAMILLE," MARIE LAURENCIN, 1908

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